S3C6410-TFA Linux Developer's Guide

TABLE OF CONTENTS

S3C6410-TFA User Manual ....

1.5.1 Configuring the Compile NAND boot support for the U-boot ....- 74 -
1.5.2 SD card support is compiled configuration to start U-boot ....- 74 -
1.5.3 U-boot instructions ....- 75 -
1.6 Configure and compile the kernel (Kernel) ....- 75 -
1.7 Configure and compile busybox ....- 76 -
1.8 Production target file system image ....- 77 -
1.8.1 Production yaffs2 file system image ....- 77 -
1.8.2 Production ubifs file system image ....- 78 -
1.8.3 create ext3 file system image ....- 78 -
1.9 Example . embedded Linux applications .....- 78 -
1.9.1 Hello, World! ....- 79 -
1.9.2 LED test program ....- 82 -
1.9.3 Test button ....- 84 -
1.9.4 PWM control buzzer programming examples ....- 85 -
1.9.5 I2C-EEPROM programming examples ....- 89 -
1.9.6 Example... Serial Programming ....- 92 -
1.9.7 UDP network programming ....- 98 -
1.9.8 Example .. math library calls ....- 103 -
1.9.9 Example. thread programming ....- 104 -
1.9.10 Pipeline Application Programming Example - Web Control LED .. ..- 106 -
1.9.11 Based on the C + + Hello, World .... --111--
1.10 Example .. embedded Linux drivers .... - 112 -
1.10.1 Hello, Module-simple embedded Linux driver module .... - 112 -
1.10.2 LED driver .... --116--
1.10.3 Key Drivers .... - 119 -
1.11 .Compile Qtopia-2.2.0 ....- 125 -
1.11.1 extracting installer source code ....- 125 -
1.11.2 Compiling and running the x86 version of Qtopia-2.2.0 ....- 125 -
1.11.3 compile and run arm version of Qtopia-2.2.0 ....- 126 -
1.12 .Compile QtE-4.7.0 ....- 127 -
1.12.1 extracting installer source code ....- 127 -
Arm version 1.12.2 compile and run the QtE-4.7.0 ....- 128 -
1.13 Compile Qtopia4 (Qt-Extended-4.4.3) ....- 129 -
1.13.1 extracting installer source code ....- 129 -
1.13.2 Compiling and running the x86 version of Qt-Extended-4.4.3 .....- 129 -
1.13.3 compile and run arm version of the Qt-Extended-4.4.3 ....- 130 -
1.14 choose which version of Qt to develop ....- 131 -

S3C6410-TFA Linux Developer's Guide

S3C6410-TFA software and **S3C6410-TFA** is fully compatible, so the path is set, the default configuration file, have followed the **S3C6410-TFA** of manuals, based on the actual situation may be slightly different, if in doubt, please contact us: info @ esys.ir

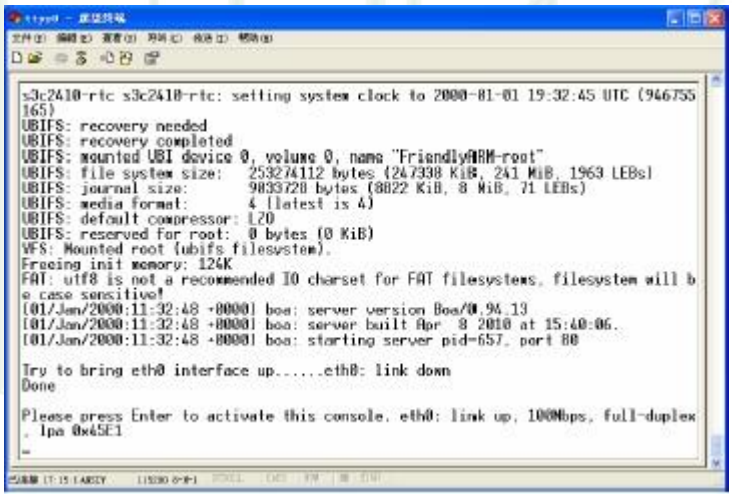
1.1 The first test of Linux graphical interface Qtopia-2.2.0, Qtopia4 and QtE-4.7.0 system

Please refer to "S3C6410-TFA functional test guide"

1.2 Development board through the serial port terminal operations

Note: Each learning expectations embedded Linux fans should learn to skillfully use the terminal console operation, all platforms Linux commands are similar, over 99% of the commands are the same.Prior to the operation of this section, please follow the "S3C6410-TFA Brush Guide" of the steps correctly set up HyperTerminal.

The following figure shows the terminal through the serial port of the Linux login screen, and this may actually not identical, but are basically similar, according to the prompt, press Enter, you can begin the journey of the Linux console.

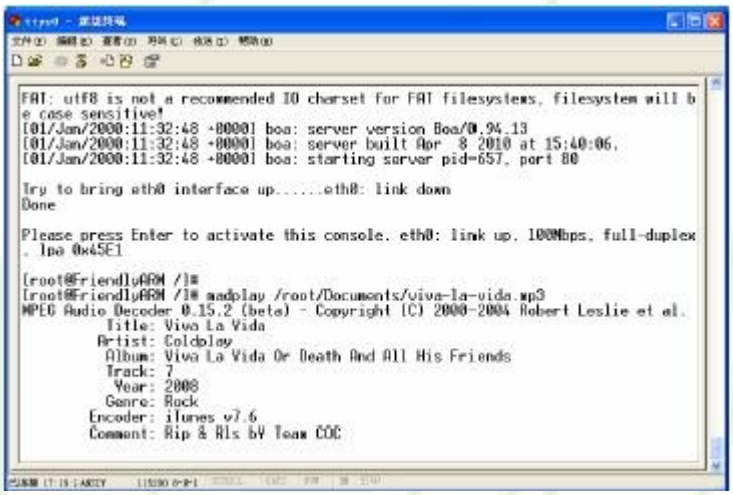

s3c2410-rtc s3c2410-rtc: setting system clock to 2000-01-01 19:32:45 UTC (946755
165)
UBIFS: recovery needed
UBIFS: recovery completed
UBIFS: mounted UBI device 0, volume 0, name "FriendlyARM-root"
UBIFS: file system size: 253274112 bytes (247338 KiB, 241 MiB, 1963 LEBs)
UBIFS: journal size: 9833728 bytes (8822 KiB, 8 MiB, 71 LEBs)
UBIFS: media format: 4 (latest is 4)
UBIFS: default compressor: LZO
UBIFS: reserved for root: 0 bytes (0 KiB)
VFS: Mounted root (ubifs filesystem).
Freeing init memory: 124K
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will b
e case sensitive!
[01/Jan/2000:11:32:48 +0000] boa: server version Boa/0.94.13
[01/Jan/2000:11:32:48 +0000] boa: server built Apr 8 2010 at 15:40:06.
[01/Jan/2000:11:32:48 +0000] boa: starting server pid=657, port 80
Try to bring eth0 interface up.....eth0: link down
Done
Please press Enter to activate this console. eth0: link up, 100Mbps, full-duplex
, lpa 0x45E1

4.2.1 mp3 player

madplay is a portable console based mp3 player.It has a variety of playback control mode, the easiest to use is:

Madplay your.mp3

The default mode will play your.mp3 command file (there is no your.mp3 development board files, here is only an example).You can run "madplay-h" to see its use to help, here is the player development board contains a preloaded mp3 screenshot:


FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will b
e case sensitive!
[01/Jan/2000:11:32:48 +0000] boa: server version Boa/0.94.13
[01/Jan/2000:11:32:48 +0000] boa: server built Apr 8 2010 at 15:40:06.
[01/Jan/2000:11:32:48 +0000] boa: starting server pid=657, port 80
Try to bring eth0 interface up.....eth0: link down
Done
Please press Enter to activate this console. eth0: link up, 100Mbps, full-duplex
, lpa 0x45E1
[root@FriendlyARM /]#
[root@FriendlyARM /]# madplay /root/Documents/viva-la-vida.mp3
MPEG Audio Decoder 0.15.2 (beta) - Copyright (C) 2000-2004 Robert Leslie et al.
Title: Viva La Vida
Artist: Coldplay
Album: Viva La Vida Or Death And All His Friends
Track: 7
Year: 2008
Genre: Rock
Encoder: iTunes v7.6
Comment: Rip & Rls bY Team COC

It should be noted is: Linux-2.6.36 kernel, we use the ALSA audio driver interface, and here we also used a portable madplay play this interface, and the development board has been built the ALSA library.

1.2.2 How to stop the program running

To stop the program running at a terminal console by pressing **Ctrl + c**, note: press the **Ctrl**, do not let go, then press the c button.

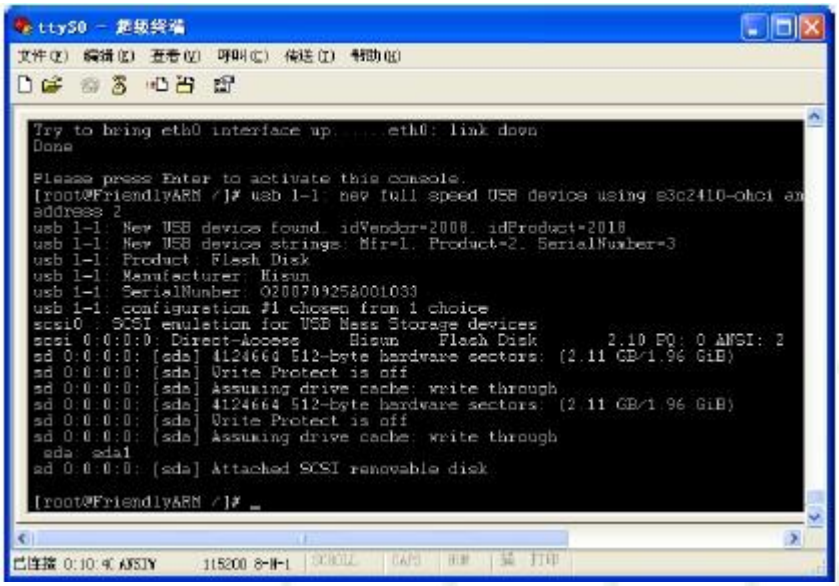
For example: we just use the command **madplay** played **mp3**, if you want to suspend the operation of this program, you can press **Ctrl + c** key.

In addition, if the program is running in the background, you can use the kill command to **kill** the process

1.2.3 use the USB / HDD

Insert USB flash drives, the system will automatically create a / udisk directory, and automatically mount the flash drive to the top, this time in the series

Population will be similar to the following information:


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
Try to bring eth0 interface up... eth0: link down
Done
Please press Enter to activate this console.
[root@FriendlyARM /]# usb 1-1: new full speed USB device using s3c2410-ohci and
address 2
usb 1-1: New USB device found, idVendor=2008, idProduct=2018
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
usb 1-1: Product: Flash Disk
usb 1-1: Manufacturer: Hisun
usb 1-1: SerialNumber: 020070925A001033
usb 1-1: configuration #1 chosen from 1 choice
scsi0 : SCSI emulation for USB Mass Storage devices
scsi 0:0:0:0: Direct-Access Hisun Flash Disk 2.10 PQ: 0 ANSI: 2
sd 0:0:0:0: [sda] 4124664 512-byte hardware sectors: (2.11 GB/1.96 GiB)
sd 0:0:0:0: [sda] Write Protect is off
sd 0:0:0:0: [sda] Assuming drive cache: write through
sd 0:0:0:0: [sda] 4124664 512-byte hardware sectors: (2.11 GB/1.96 GiB)
sd 0:0:0:0: [sda] Write Protect is off
sd 0:0:0:0: [sda] Assuming drive cache: write through
sda: sda1
sd 0:0:0:0: [sda] Attached SCSI removable disk
[root@FriendlyARM /]#

USB device corresponding to the device is actually called / dev / udisk.Enter / udisk directory, you can see inside the file.Note: If your flash drive is not recognized, please check that it is not FAT32/VFAT format

ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[root@FriendlyARM /udisk]# ls
I'm So Paid.mp3 infinity 2008.mp3
[root@FriendlyARM /udisk]# mount
rootfs on / type rootfs (rw)
/dev/root on / type yaffs (rw)
none on /proc type proc (rw)
none on /sys type sysfs (rw)
none on /proc/bus/usb type usbfs (rw)
none on /dev type ramfs (rw)
none on /dev/pts type devpts (rw,mode=622)
tmpfs on /dev/shm type tmpfs (rw)
none on /tmp type ramfs (rw)
none on /var type ramfs (rw)
/dev/udisk on /udisk type vfat (rw,sync,nosuid,nodev,noatime,nodiratime,fmask=
22,dmask=0022,codepage=cp437,iocharset=iso8859-1)
[root@FriendlyARM /udisk]#

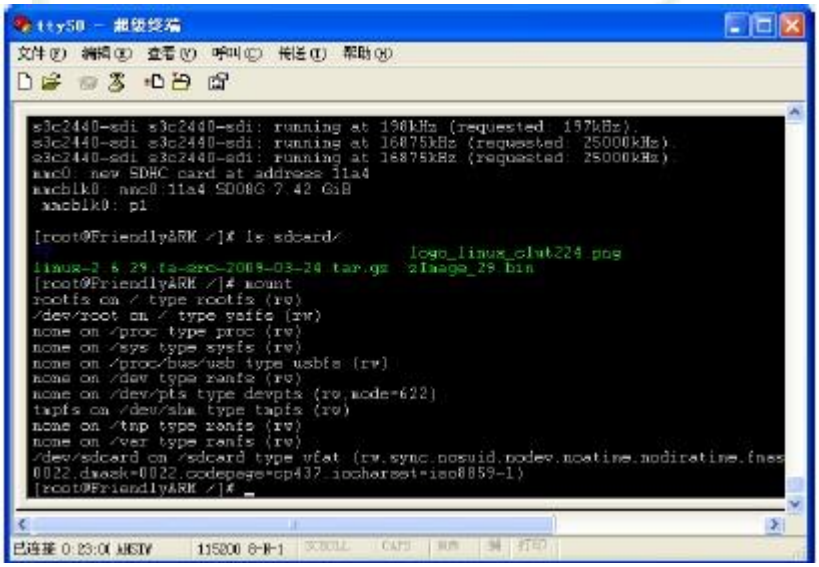
1.2.4 SD card

Information:

And use the same USB, **SD** card is mounted automatic identification, insert the **SD** card can then see the following in the serial

ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[01/Jan/1970:00:00:08 +0000] bce starting server pid=496, port 80
Try to bring eth0 interface up..... eth0: link down
Done
Please press Enter to activate this console.
[root@FriendlyARM /]#
[root@FriendlyARM /]#
[root@FriendlyARM /]# s3c2440-sdi s3c2440-sdi: running at 0kHz (requested: 0kH
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 16875kHz (requested: 25000kHz)
s3c2440-sdi s3c2440-sdi: running at 16875kHz (requested: 25000kHz)
mmc0: new SDHC card at address 11a4
mmcblk0: mmc0:11a4 SD08G 7.42 GiB
mmcblk0: p1
[root@FriendlyARM /]#

The system will automatically create / sdcard directory, and mount to the top of the SD device, as shown:


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
s3c2440-sdi s3c2440-sdi: running at 198kHz (requested: 197kHz).
s3c2440-sdi s3c2440-sdi: running at 16875kHz (requested: 25000kHz)
s3c2440-sdi s3c2440-sdi: running at 16875kHz (requested: 25000kHz)
mmc0: new SDHC card at address 11a4
mmcblk0: mmc0:11a4 SD08G 7.42 GiB
mmcblk0: p1
[root@FriendlyARM /]# ls sdcard/
logo_linux_clut224.png
linux-2.6.29.6-src-2009-03-24.tar.gz zImage_29.bin
[root@FriendlyARM /]# mount
rootfs on / type rootfs (rw)
/dev/root on / type yaffs (rw)
none on /proc type proc (rw)
none on /sys type sysfs (rw)
none on /proc/bus/usb type usbfs (rw)
none on /dev type ramfs (rw)
none on /dev/pts type devpts (rw,mode=622)
tmpfs on /dev/shm type tmpfs (rw)
none on /tmp type ramfs (rw)
none on /var type ramfs (rw)
/dev/sdcard on /sdcard type vfat (rw,sync,nosuid,nodev,noatime,nodiratime,fmas
0022,dmask=0022,codepage=cp437,iocharset=iso8859-1)
[root@FriendlyARM /]#

1.2.5 How to transfer files to each other and the PC serial port

Note: Use the USB to serial port, there may not be smooth, and we think it's USB to serial cable quality and performance related.

When the log through the serial port terminal, you can use the rz or sz command via the serial port and PC to transfer files to each other, as follows.

(1) sz send files to the PC HyperTerminal window,

(2) right click, the pop-up menu, select "Receive file" began to set the receive textParts catalog and protocols, as shown.

Then enter the terminal command line "sz / root/Documents/viva-la-vida.mp3" command, began to PC Transfer is located in "/ root / Documents /" directory of the viva-la-vida.mp3 files (or other documents , change it path and file name on it), because the files are large, so it is necessary to wait a few minutes, is transmitted, the system will automatically save the file to the directory you set as shown.

(2) rz command to download files to the development board in the serial terminal input "rz" command to start the transfer over from the PC to receive files. Then in the HyperTerminal window, right click, the pop-up menu, select "Send File", set to

Send the file and use the protocol, as shown, the development board began to send the file.

Point "send", the board began to receive the file, as shown.

Transfer is completed, will be the same in the current directory, the file name of the file, you can use the md5sum command to verify that the file and source files are the same.

1.2.6 The LED control panel

Test the program name: led-player		Remarks
Source code file name	led-player.c led.c	
Source code location of the CD	Extract Linux \ examples.tgz available	
Development board device name corresponding to	/dev/leds	
Corresponding to the kernel driver source code	Linux-2.6.36/drivers/char/S3C6410-TFA_leds.c	
Other:		

Test the program name: led-player leds		Remarks
Source code or the name of the source code package	Leds.cgi	In the development board
Source code or the location of the source code package	Development board is located in the / www directory	
Description: **leds.cgi is a shell script file, it is not binary, the script is called by leds.html,** **Which is the most common use of web design techniques.** **Extract CD root_default.tgz which can also be leds.cgi and leds.html www directory files,** **They are scripts, source code itself, using any text editor (such as Windows "Notepad") can be** **Open the.**		

Description: Led-player and control the LED via the web are a early development for the SBC2410 simple example program, its hardware independence, it can be easily ported to other systems.Some books currently on the market, some

2410/2440/6410 development board manufacturers are using this example of a typical pipeline application.

(1) LED server

Boot into the system, will automatically run an LED service program (/ etc / rc.d / init.d / leds), it is a **led-player** calls a script, led-player is running, will be in the / tmp directory, create a **led-control** the file, and send different parameters to the pipeline led flashing mode can be changed:

 # Echo 0 0.2> / tmp / led-control

After running this command, four users will be led each time interval of 0.2 seconds to run Marquee.

 # Echo 1 0.2> / tmp / led-control

Run the command, led four users will be the time interval of 0.2 seconds to run accumulator.

 # / Etc / rc.d / init.d / leds stop

After running this command, four user-led will stop flashing.

 # / Etc / rc.d / init.d / leds start

Run the command, led four users will start flashing.

(2) individually controlled LED

/ Bin / leds can be controlled is a single led the utility to use the leds must stop led-player, the following command:

 # / Etc / rc.d / init.d / leds stop

This command will stop led led-player of the manipulation.led to use as follows:

[Root @ fa /] **# led**

Usage: leds led_no 0 | 1led_no to operate the led (for 0,1,2,3), 0 and 1 represent off and light up.

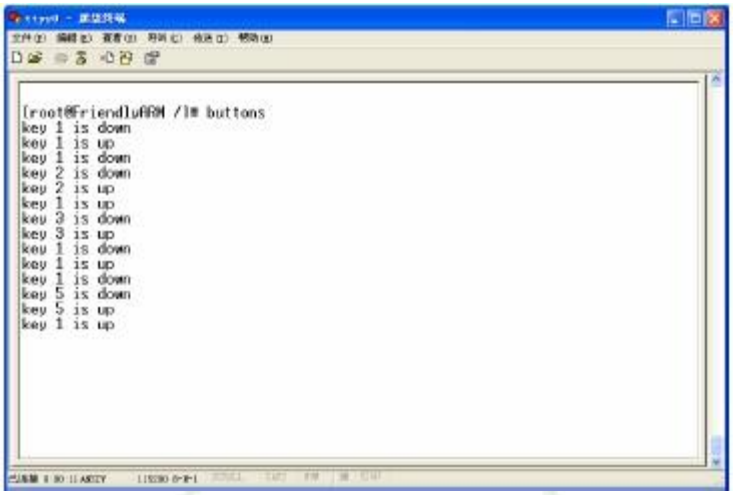
 # Led 2 1

LED3 will light

1.2.7 Buttons on the test

Test the program name: buttons	Remarks
Test program source code file name	Buttons_test.c
Location of the test program source code	Extract linux \ examples.tgz available
Development board device name corresponding to	/dev/buttons
Corresponding to the kernel driver source code	Linux-2.6.36/drivers/char/S3C6410-TFA_buttons.c
Other:	

In the command line input "buttons" command, then press the key development board, you can display the corresponding key, as shown in Figure



1.2.8 Serial Testing

Description: armcomtest is a set to facilitate testing and development of simple and practical under linux serial port terminal program that uses standard system calls, and hardware.General Linux system boot, the serial port 0, 1, respectively, corresponding to the device name / dev/**ttySAC0, 1,2,3**

Test the serial port 2 need help with serial port of another PC, use the provided serial cable and a small expansion board (optional), connect the COM2 serial port and another PC, and set the PC mentioned above HyperTerminal to 115200 baud, no flow control, and other default.

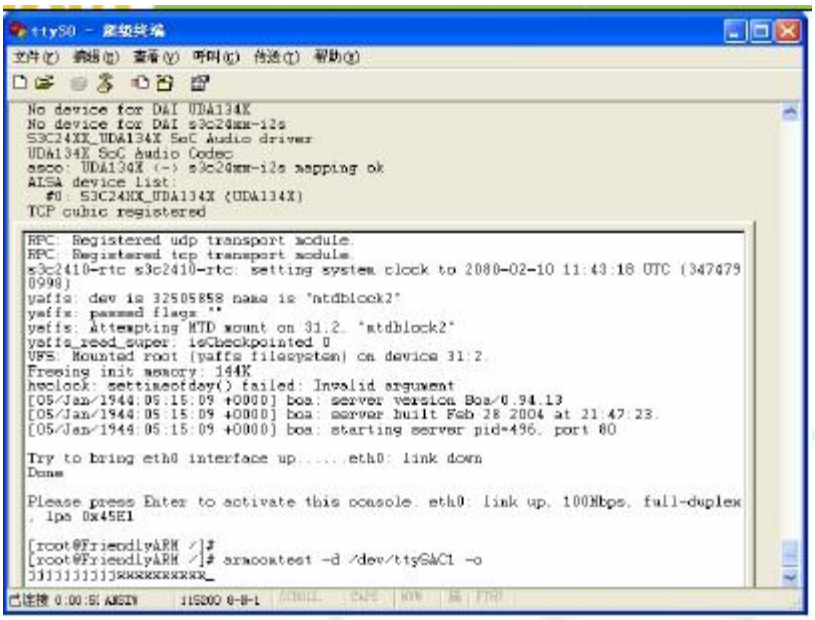
In the command line, enter:

Armcomtest-d / dev/ttySAC1-o

Then if you enter characters on another PC HyperTerminal appears, and vice versa. If you want to test the serial port 3, you need to connect a small expansion board COM3, and the command line type:

Armcomtest-d / dev/ttySAC2-o

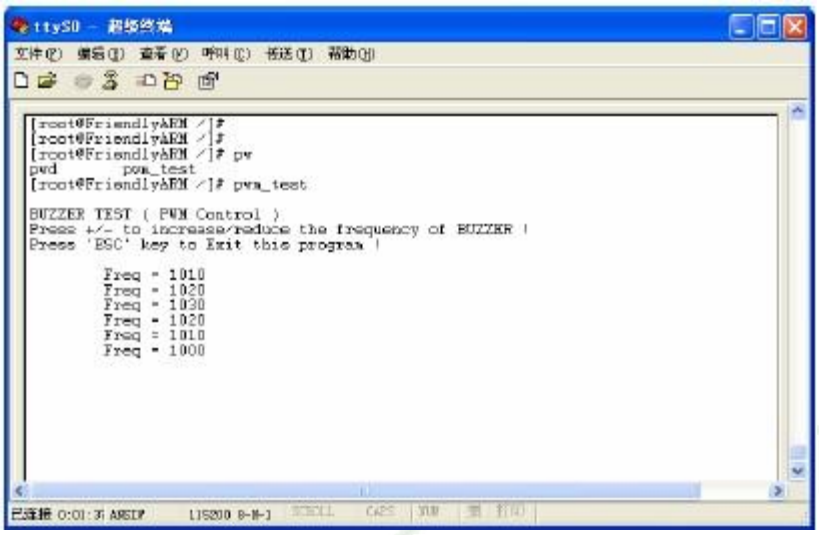
Here is the test of the interface:


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
No device for DAI UDA134X
No device for DAI s3c24xx-i2s
S3C24XX_UDA134X SoC Audio driver
UDA134X SoC Audio Codec
asoc: UDA134X <-> s3c24xx-i2s mapping ok
ALSA device list:
#0: S3C24XX_UDA134X (UDA134X)
TCP cubic registered
RPC: Registered udp transport module.
RPC: Registered tcp transport module.
s3c2410-rtc s3c2410-rtc: setting system clock to 2000-02-10 11:43:18 UTC (347479
0998)
yaffs: dev is 32505858 name is "mtdblock2"
yaffs: passed flags ""
yaffs: Attempting MTD mount on 31.2, "mtdblock2"
yaffs_read_super: isCheckpointed 0
VFS: Mounted root (yaffs filesystem) on device 31:2.
Freeing init memory: 144K
hwclock: settimeofday() failed: Invalid argument
[05/Jan/1944:05:15:09 +0000] boa: server version Boa/0.94.13
[05/Jan/1944:05:15:09 +0000] boa: server built Feb 28 2004 at 21:47:23.
[05/Jan/1944:05:15:09 +0000] boa: starting server pid=496, port 80
Try to bring eth0 interface up.....eth0: link down
Done
Please press Enter to activate this console. eth0: link up, 100Mbps, full-duplex
, lpa 0x45E1
[root@FriendlyARM /]#
[root@FriendlyARM /]# armcontest -d /dev/ttySAC1 -o
jjjjjjjjjjKKKKKKKKKK_

1.2.9 Test Buzzer

Species in the command line input: pwm_test

You can hear the sound of the buzzer, press the "+" or "-" can change the output frequency, as shown in Figure. Press ESC to stop the test.



1.2.10 adjust LCD backlight control

Hint:

LCD backlight device file: / dev/backlight-1wire

Using the touch-line LCD driver board, but also built the circuit and adjust the backlight to achieve, the backlight control parameters is carried out by front-line transmission protocol and the motherboard, it can support 127 backlight adjustment, when sending the number "0" to the backlight device file , it will turn off the backlight:

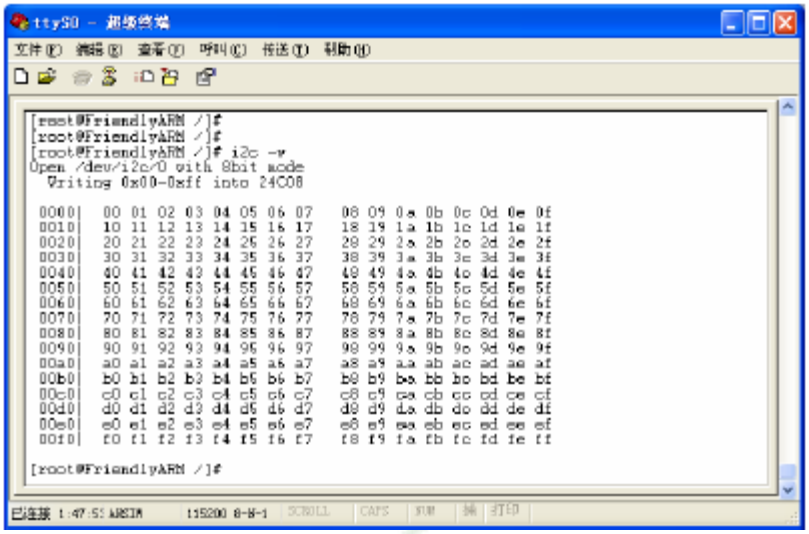
Kinds of input on the command line: echo 0> / dev / backlight can turn off the LCD backlight

When sending 1-127 to backlight device, you can adjust the backlight brightness; which 127 is the brightest, usually 15 or so, you can see some pictures secretly, for 1-15, the basic dark.When greater than 127, it will be handled as a 127, which is the brightest.

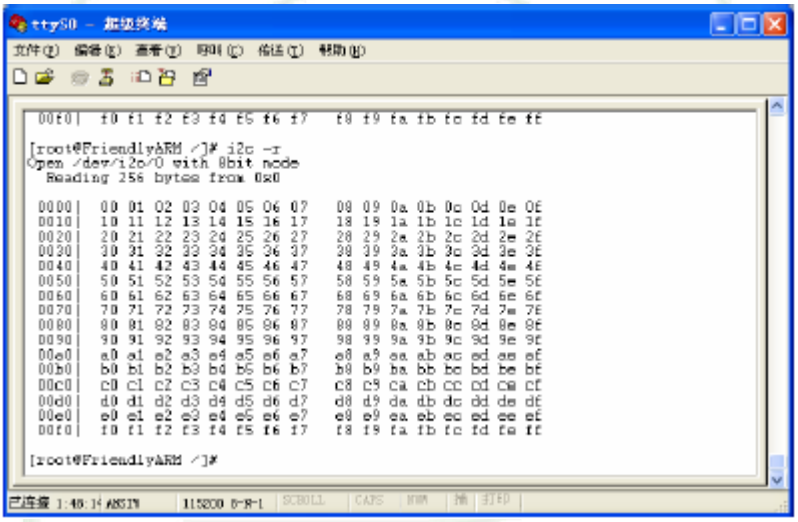
Kinds of input on the command line: echo 15> / dev / backlight can see a little light.

1.2.11 test I2C-EEPROM

Species in the command line input: i2c-w to the board of the 24C08 device can write data (0x00-0xff)



In the command line, type: i2c-r devices from the board read the 24C08 output

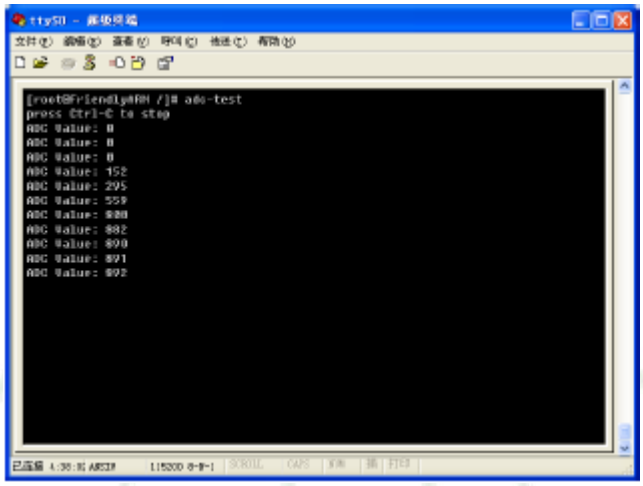


1.2.12 AD conversion test

Remarks test program source code: adc-test	Remarks
file name	Adc-test.c
Location of the test program source code	Extract linux \ examples.tgz available
Development board device name corresponding to	/dev/adc
Corresponding to the kernel driver source code	Linux-2.6.36/drivers/char/S3C6410-TFA_adc.c
Other:	

In the command line input adc-test command, ADC conversion can be tested, adjust the adjustable resistance on the development of plate board

W1, you can see from the output terminal serial conversion results.



1.2.13 Test TV-OUT

Into the / usr / bin directory, attention is not "/ user / bin", running tv-test command can be TV-OUT test, the program will automatically play / usr/bin/TestVectors/wanted.264 file, and output to the TV, such as map

 # Cd / usr / bin

 # Tv-test

1.2.14 Test Media Player

See "S3C6410-TFA function testing guidelines" section 1.3

1.2.15 use a USB wireless network card or SD WiFi

We recommend that you use the graphical interface program to set up and use WiFi wireless network card, will be more convenient, the WiFi for the command line program, we will no longer be updated and maintained.Graphical interface settings, see "S3C6410-TFA functional test guide" at section 1.12.

Note: The following descriptions are for the prior reservation is no longer updated.

To facilitate the use of embedded Linux USB WiFi and SD WiFi and other wireless LAN, we have developed based on a S3C2440-FA development board's USB WiFi kits command line utility, the tool set can support thousands of models of USB wireless card (USB wireless network card to use most of the internal chip is the same), and now we have ported it to the 6410 platform, and integrated SD WiFi driver

Here are some steps to use the tool set:

The tool set includes a wireless network card driver, and will use the following three command-line utility program:

● scan-wifi - to scan for nearby wireless networks

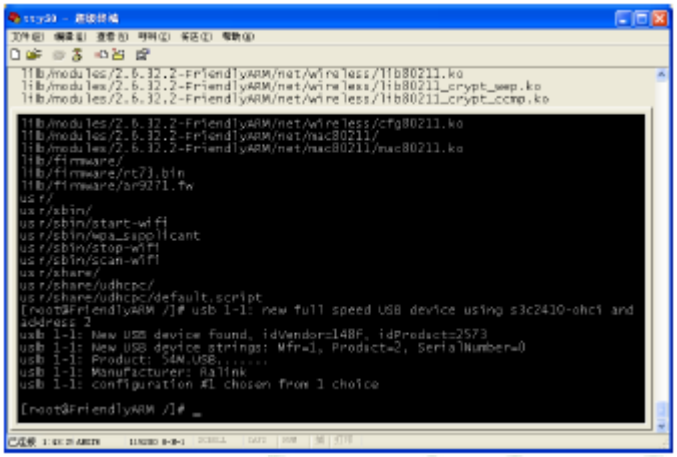
● start-wifi - connect to open wireless network

● stop-wifi - stop using the wireless network is installed in the three program development board / usr / sbin directory

1. Scan for nearby wireless networks

Note: The following example is using a USB wireless adapter Model: **TL-WN321G +, SD-WiFi** module and use similar, it is no longer alone shows.

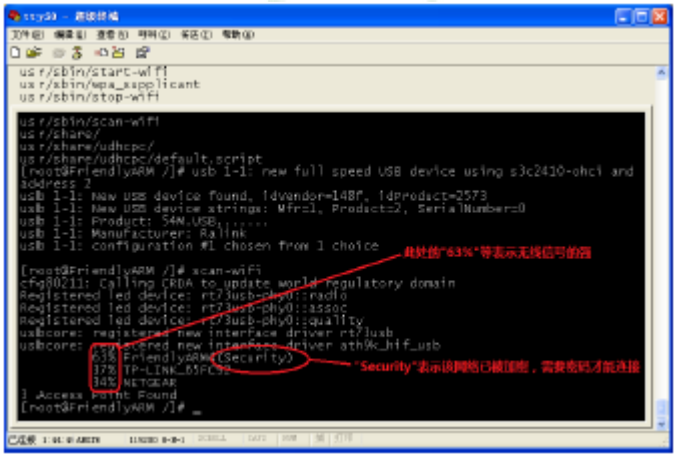
The **USB** wireless card found on the target board, the following information will appear (different model card information will be different)


usr/sbin/start-wifi
usr/sbin/wpa_supplicant
usr/sbin/stop-wifi
usr/sbin/scan-wifi
usr/share/
usr/share/udhcpc/
usr/share/udhcpc/default.script
[root@FriendlyARM /]# usb 1-1: new full speed USB device using s3c2410-ohci and address 2
usb 1-1: New USB device found, idVendor=148f, idProduct=2573
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-1: Product: 54M.USB.....
usb 1-1: Manufacturer: Ralink
usb 1-1: configuration #1 chosen from 1 choice
[root@FriendlyARM /]#

Scan command to search for nearby wireless networks:

 # Scan-wifi

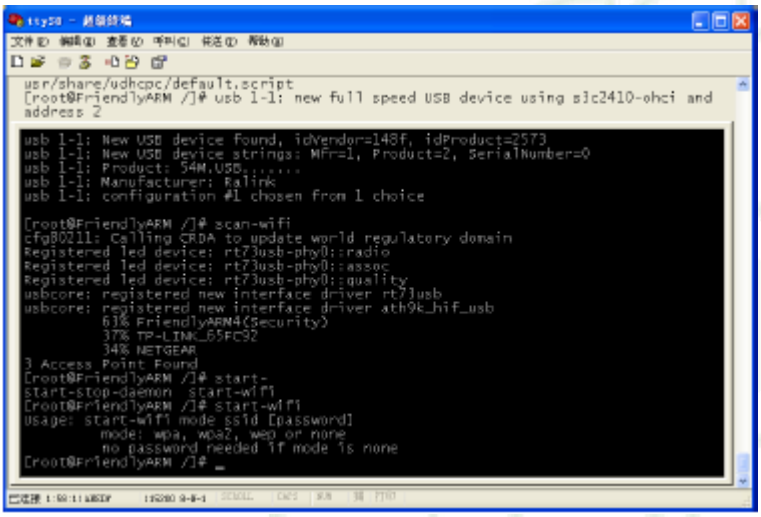
@as shown in the following picture



Have seen the search to three wireless network, wireless network name before the "63%" means the signal strength, network with password security will be marked with **"Security".**

2. Connection using a wireless network

Using the **"start-wifi"** command can automatically connect to specific wireless network access points, depending on the wireless network characteristics, have different parameters on the command line, type **"start-wifi"** you can see the following message:


usr/share/udhcpc/default.script
[root@FriendlyARM /]# usb 1-1: new full speed USB device using s3c2410-ohci and address 2
usb 1-1: New USB device found, idVendor=148f, idProduct=2573
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-1: Product: 54M.USB.....
usb 1-1: Manufacturer: Ralink
usb 1-1: configuration #1 chosen from 1 choice
[root@FriendlyARM /]# scan-wifi
cfg80211: Calling CRDA to update world regulatory domain
Registered led device: rt73usb-phy0::radio
Registered led device: rt73usb-phy0::assoc
Registered led device: rt73usb-phy0::quality
usbcore: registered new interface driver rt73usb
usbcore: registered new interface driver ath9k_hif_usb
61% FriendlyARM4(Security)
37% TP-LINK_65FC92
34% NETGEAR
3 Access Point Found
[root@FriendlyARM /]# start-
start-stop-daemon start-wifi
[root@FriendlyARM /]# start-wifi
Usage: start-wifi mode ssid [password]
mode: wpa, wpa2, wep or none
no password needed if mode is none
[root@FriendlyARM /]#

Wherein:

mode - indicates that the wireless network encryption type, you can **"wpa", "wpa2", "wep" or "none", "none"** means no wireless network without a password.

ssid - that want to connect to the wireless network name,

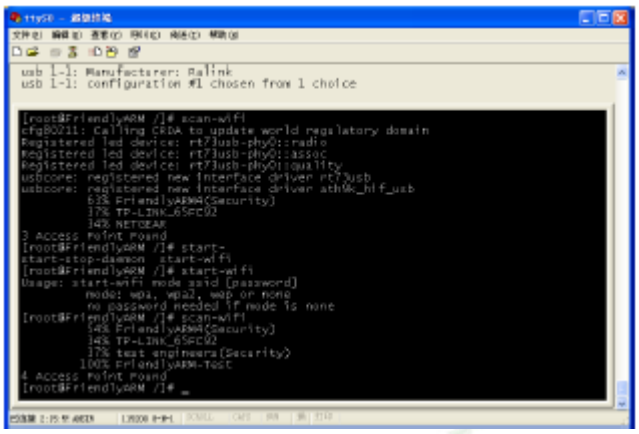
"NETGEAR" and so on, this is generally according to the actual situation.

password - encrypted wireless network that required a password, will be displayed in clear text. Here mainly for non-security encryption and secure encrypted network with examples illustrate, respectively.

2.1 Connect the open wireless network without a password

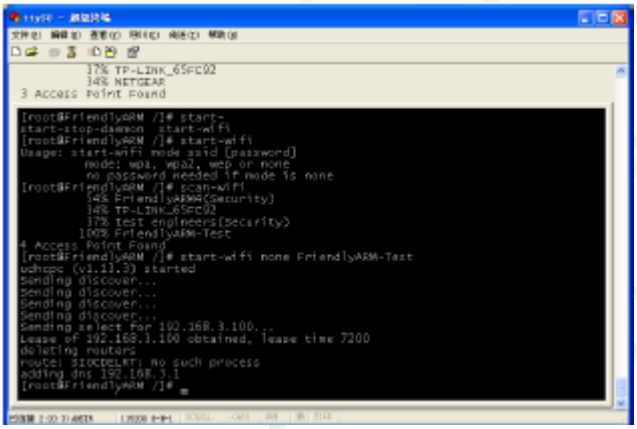
Step1

First, use the "scan-wifi" scan for nearby wireless networks, the results shown here **,** is designed for testing without a password set up a wireless network access points open.

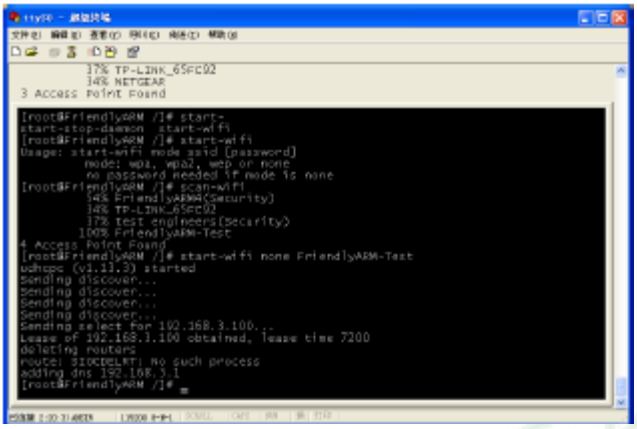


Step2

Enter the "start-wifi command to start automatically connect to the wireless network, as shown in Figure.



Wait a moment, you can see the target board has automatically assigned an IP address: 192.168.3.100, use the ping command to test the network connection, as shown in Figure.



At this point you can enter on the **PC** browser development board ip address: **192.168.3.100**, see the development board in **web** server, as shown in Figure.

2.2 connection requires a password to use secure wireless network

connection wireless network with a password similar to the steps and over, but need to know in advance when connecting Wireless

Network encryption type and password, encryption type if you do not know, only **in "wpa", "wpa2", "wep"** guess of these three options, and specific steps are as follows:

Step1

Set the security mode wireless router, wireless router model used here is**: TL-WR740N**, open the Settings page, shown in Figure

You can see, here there are three encryption modes:

● WPA-PSK/WPA2-PSK

●WPA/WPA2

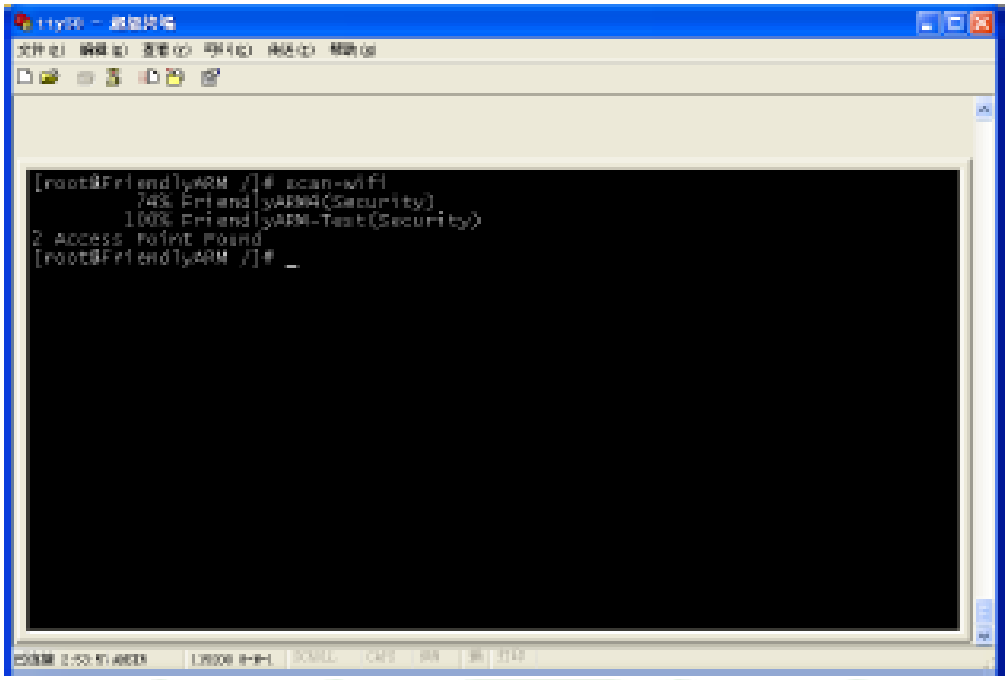
● WEP

We chose the first **"WPA",** it is for the individual of a common security encryption mode, set the password to **"test1234"**, save, and restart the router.

Note: on how to set up a wireless router, we do not make a detailed presentation of this description, most of these devices have supporting manual, and each manufacturer will be different, depending on the actual situation on their own setting.

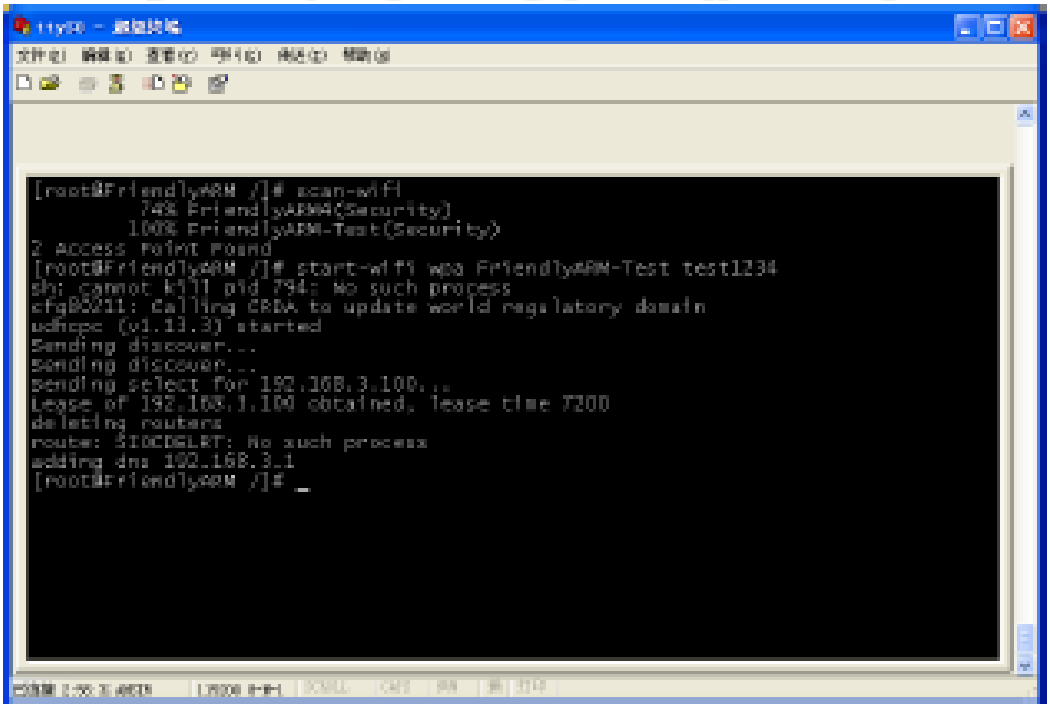
Step2

Using the **"scan-wifi"** scan for nearby wireless networks, is designed for testing without a password set up a wireless network access points open, visible, it is to be encrypted Wireless the network.

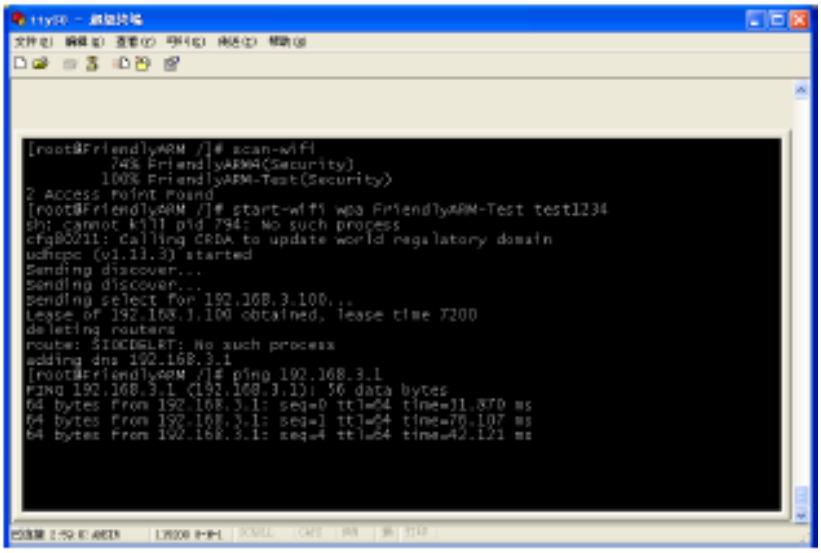


Step3

Enter the **"start-wifi wpa Pardazeh Sabz-Test test1234"** command to start automatically connect to the wireless network, as shown in Figure.



Wait a moment, you can see the target board has automatically assigned an IP address**: 192.168.3.100,** use the **ping** command to test the network connection, as shown in Figure.


[root@FriendlyARM /]# scan-wifi
74% FriendlyARM(Security)
100% FriendlyARM-Test(Security)
2 Access Point Found
[root@FriendlyARM /]# start-wifi wpa FriendlyARM-Test test1234
sh: cannot kill pid 794: No such process
cfg80211: Calling CRDA to update world regulatory domain
udhcpc (v1.11.3) started
Sending discover...
Sending discover...
Sending select for 192.168.3.100...
Lease of 192.168.3.100 obtained, lease time 7200
deleting routers
route: SIOCDELRT: No such process
adding dns 192.168.3.1
[root@FriendlyARM /]# ping 192.168.3.1
PING 192.168.3.1 (192.168.3.1): 56 data bytes
64 bytes from 192.168.3.1: seq=0 ttl=64 time=31.870 ms
64 bytes from 192.168.3.1: seq=1 ttl=64 time=76.107 ms
64 bytes from 192.168.3.1: seq=4 ttl=64 time=42.121 ms

At this point you can enter on the PC browser development board ip address: 192.168.3.100, see the development board inweb server, as shown in Figure.

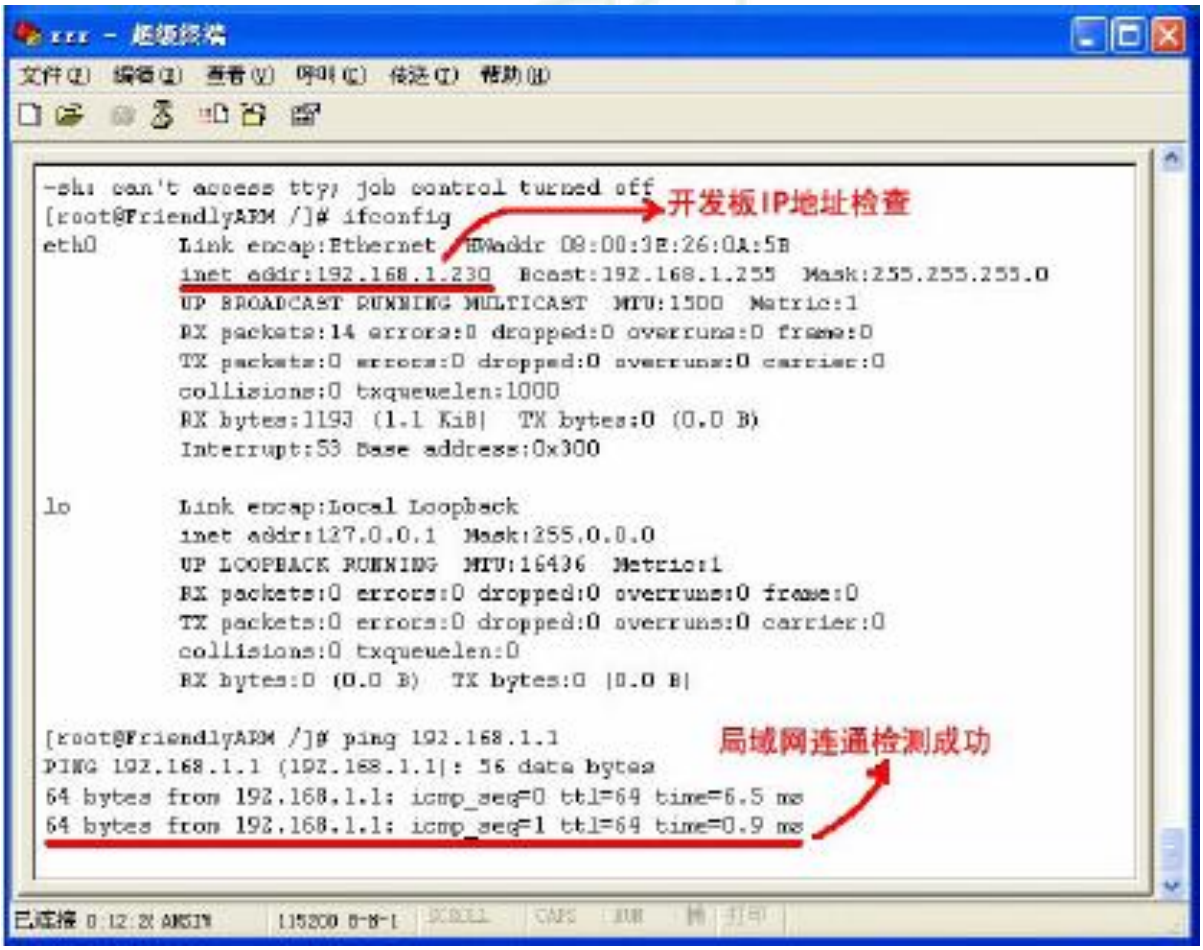
3. Disconnect the USB wireless network

To break the development board USB WiFi connection, you can use the command line type "stop-wifi" command, no longer in this screenshot shows.

1.2.16 on the bbs using telnet

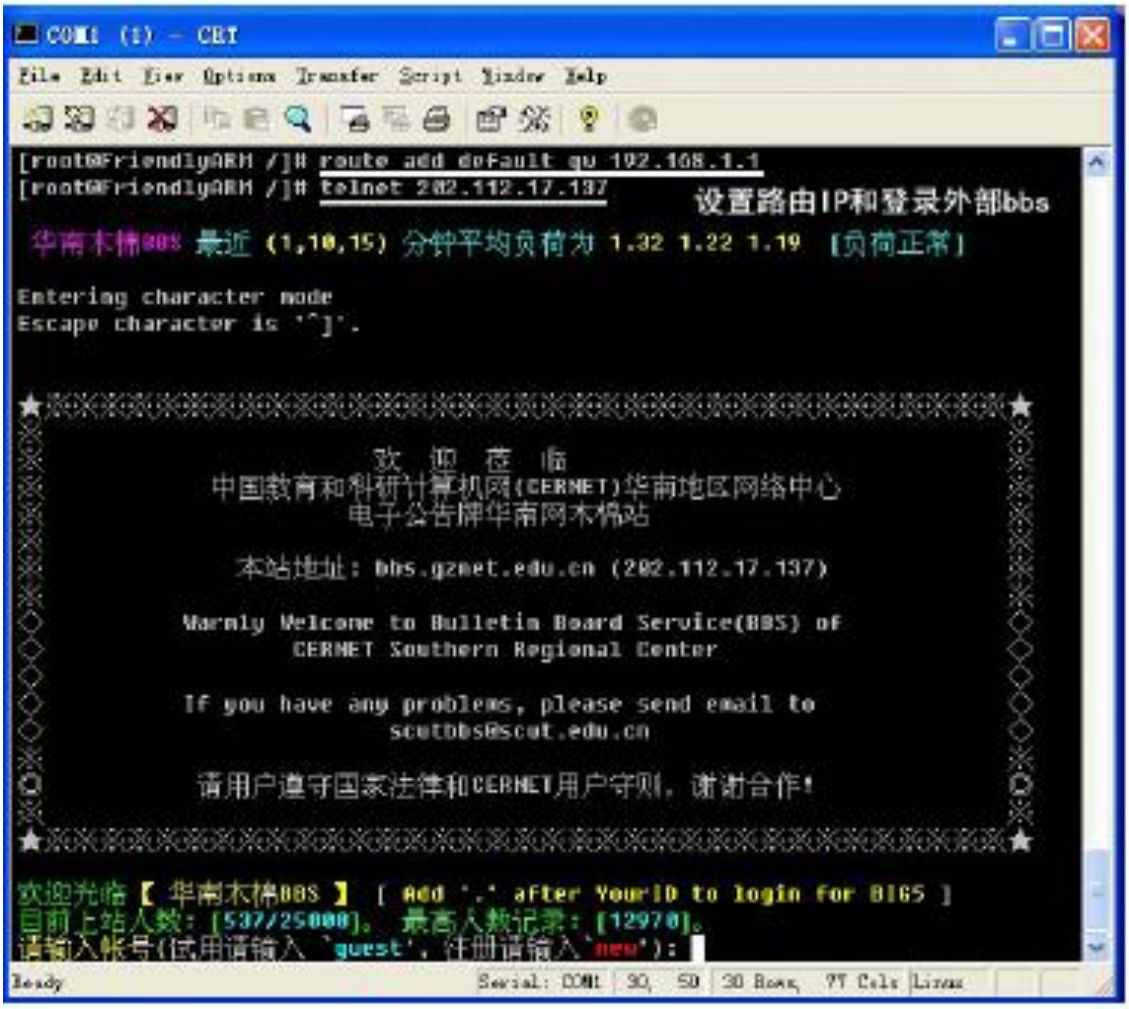
telnet is a frequently used tool for remote login using **telnet** function, you can log in from the development board provides a **telnet** server to another host, if you can access the network on board the Internet, you can log in via telnet command external bbs .

First, make sure the development board's **IP** address is **192.168.1.230,** and whether the other host and LAN connected, as shown for the success of the information.


开发板IP地址检查
局域网连通检测成功
-sh: can't access tty; job control turned off
[root@FriendlyARM /]# ifconfig
eth0 Link encap:Ethernet HWaddr 08:00:3E:26:0A:5B
inet addr:192.168.1.230 Bcast:192.168.1.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:14 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:1193 (1.1 KiB) TX bytes:0 (0.0 B)
Interrupt:53 Base address:0x300
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
[root@FriendlyARM /]# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=6.5 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.9 ms

Then set the Route IP: **route add default gw 192.168.1.1**

Finally, use the telnet command to log the host you want to register, log in here is the South kapok bbs.


COM1 (1) - CRT
File Edit View Options Transfer Script Window Help
[root@FriendlyARM /]# route add default gw 192.168.1.1
[root@FriendlyARM /]# telnet 202.112.17.137
设置路由IP和登录外部bbs
华南木棉BBS 最近 (1,10,15) 分钟平均负荷为 1.32 1.22 1.19 [负荷正常]
Entering character mode
Escape character is '^]'.
欢 迎 莅 临
中国教育和科研计算机网(CERNET)华南地区网络中心
电子公告牌华南网木棉站
本站地址: bbs.gznet.edu.cn (202.112.17.137)
Warmly Welcome to Bulletin Board Service(BBS) of
CERNET Southern Regional Center
If you have any problems, please send email to
scutbbs@scut.edu.cn
请用户遵守国家法律和CERNET用户守则，谢谢合作!
欢迎光临【 华南木棉BBS 】 [Add '.' after YourID to login for BIG5]
目前上站人数: [537/25000]。 最高人数记录: [12970]。
请输入帐号(试用请输入 `guest', 注册请输入`new'):
Ready
Serial: COM1 30, 50 30 Rows, 97 Cols Linux

1.2.17 How to set the network to access the Internet

First make sure your network environment can normally access the internet, please write down your network environment used by the gateway IP

Address, such as I have here is 192.168.1.1, then use the route set:

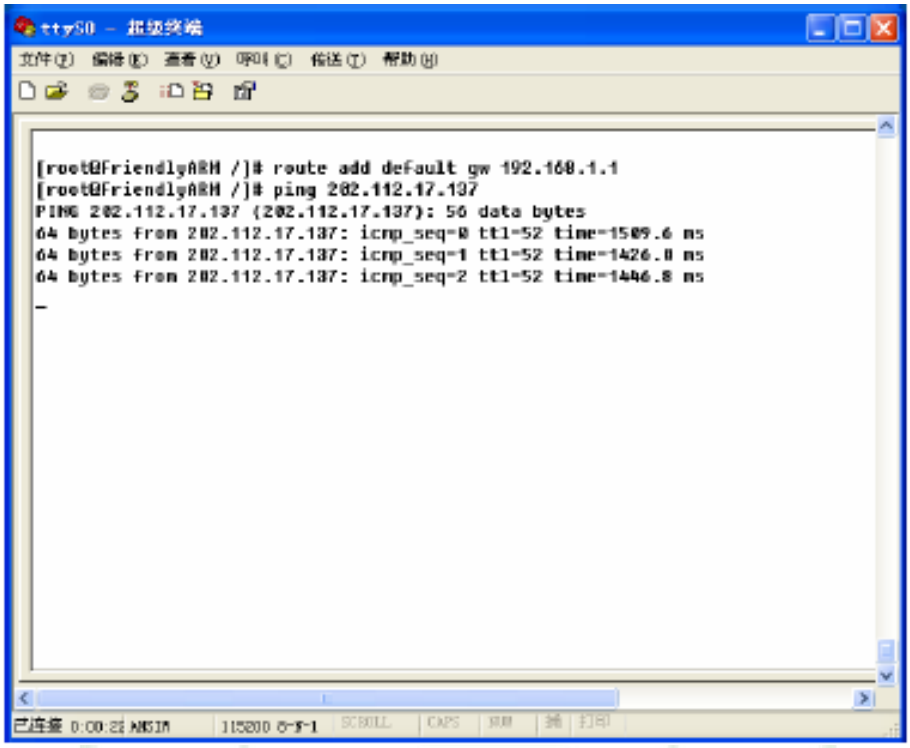
Route add default gw 192.168.1.1

Then you can directly access the numeric IP addresses on the Internet, such as the ping the kapok of South BBS (its IP

Address 202.112.17.137):

Ping 202.112.17.137

Shown that the network can ping the outside:


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[root@FriendlyARM /]# route add default gw 192.168.1.1
[root@FriendlyARM /]# ping 202.112.17.137
PING 202.112.17.137 (202.112.17.137): 56 data bytes
64 bytes from 202.112.17.137: icmp_seq=0 ttl=52 time=1589.6 ms
64 bytes from 202.112.17.137: icmp_seq=1 ttl=52 time=1426.8 ms
64 bytes from 202.112.17.137: icmp_seq=2 ttl=52 time=1446.8 ms

External network to be able to ping the real-name site, also need to set up DNS server, first check your current network uses DNS server IP address (ask your network administrator):

For example, I am here for the DNS server IP "202.96.128.86", in the development board in this set:

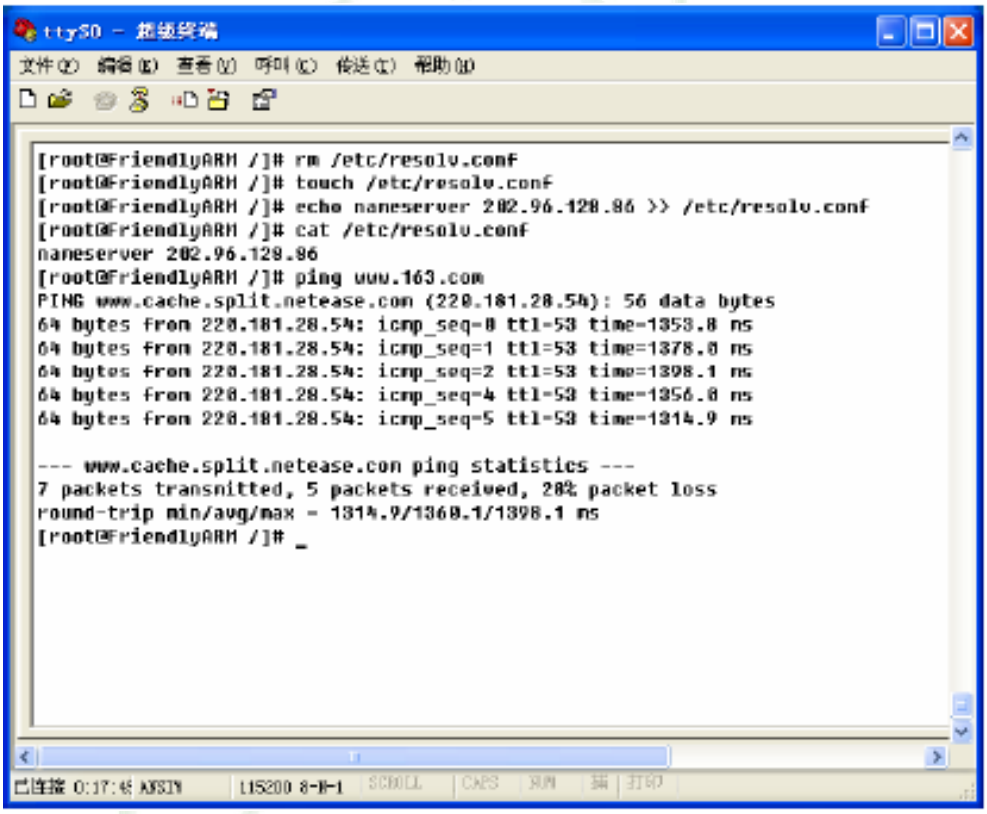
Rm / etc / resolv.conf; first delete the old profile

Touch / etc / resolv.conf; re-generate a resolv.conf file

Echo nameserver 202.96.128.86>> / etc / resolv.conf; use the actual DNS server IP configuration

resolv.conf file

Here you can modify the main **/ etc / resolv.conf** file, of course, you can use vi to be modified. The whole process as shown below:

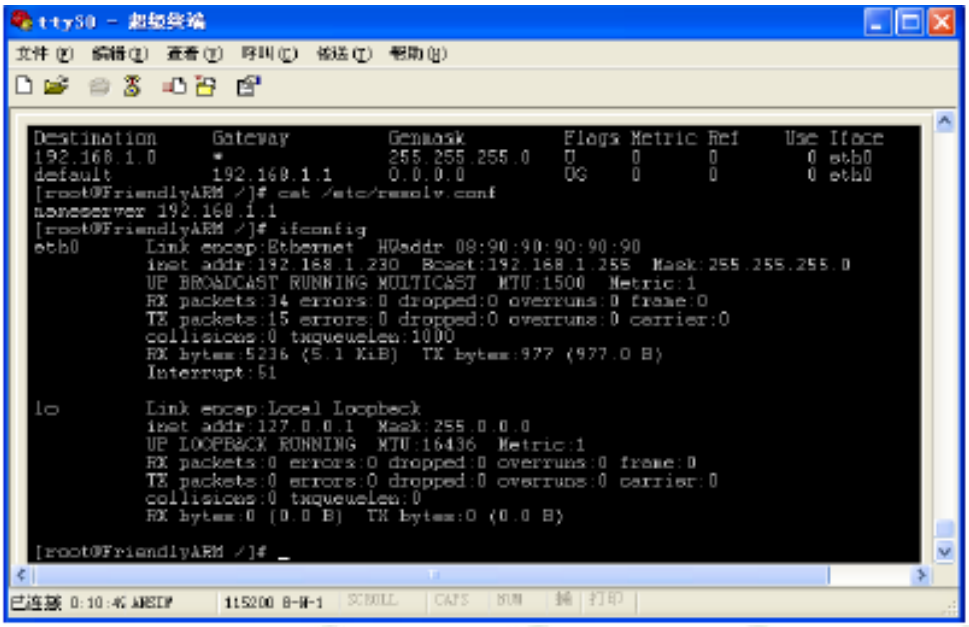

ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[root@FriendlyARM /]# rm /etc/resolv.conf
[root@FriendlyARM /]# touch /etc/resolv.conf
[root@FriendlyARM /]# echo nameserver 202.96.128.86 >> /etc/resolv.conf
[root@FriendlyARM /]# cat /etc/resolv.conf
nameserver 202.96.128.86
[root@FriendlyARM /]# ping www.163.com
PING www.cache.split.netease.com (220.181.28.54): 56 data bytes
64 bytes from 220.181.28.54: icmp_seq=0 ttl=53 time=1353.8 ms
64 bytes from 220.181.28.54: icmp_seq=1 ttl=53 time=1378.0 ms
64 bytes from 220.181.28.54: icmp_seq=2 ttl=53 time=1398.1 ms
64 bytes from 220.181.28.54: icmp_seq=4 ttl=53 time=1356.8 ms
64 bytes from 220.181.28.54: icmp_seq=5 ttl=53 time=1314.9 ms
--- www.cache.split.netease.com ping statistics ---
7 packets transmitted, 5 packets received, 28% packet loss
round-trip min/avg/max = 1314.9/1360.1/1398.1 ms
[root@FriendlyARM /]# _
已连接 0:17:45 ANSIW
115200 8-N-1
SCROLL
CAPS
NUM

1.2.18 How to set the MAC address

Development board used the MAC address is "soft" in nature, so you can reset it through the ifconfig command to fit in a network environment with the use of multi-chip board case, as follows:

First look at the current use ifconfig mac address, run:

Ifconfig; **attention to the back do not tell anything**


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
Destination Gateway Genmask Flags Metric Ref Use Iface
192.168.1.0 * 255.255.255.0 U 0 0 0 eth0
default 192.168.1.1 0.0.0.0 UG 0 0 0 eth0
[root@FriendlyARM /]# cat /etc/resolv.conf
nameserver 192.168.1.1
[root@FriendlyARM /]# ifconfig
eth0 Link encap:Ethernet HWaddr 08:90:90:90:90:90
inet addr:192.168.1.230 Bcast:192.168.1.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:34 errors:0 dropped:0 overruns:0 frame:0
TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:5236 (5.1 KiB) TX bytes:977 (977.0 B)
Interrupt:51
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
[root@FriendlyARM /]#
已连接 0:10:45 ANSIW
115200 8-N-1
SCROLL
CAPS
NUM

You can see the current mac address "08:90:90:90:90:90", which is the default in the NIC driver mac address, it has been coded into the kernel, unless you change the network card driver source code and re-compiled a new kernel.To dynamically change the operating system mac address, first close the current network, and reset the mac address using ifconfig:

Ifconfig eth0 down

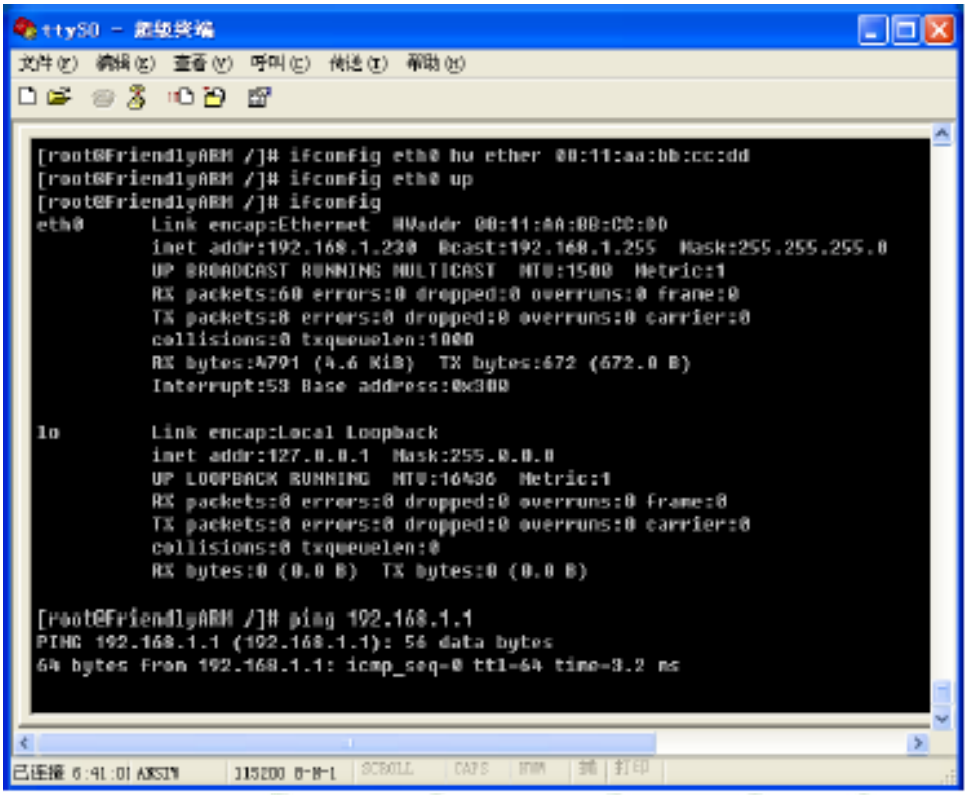
Ifconfig eth0 hw ether 00:11: AA: BB: CC: DD**; tips: a, b, c, d, e, f can be lower case and then** open the network and view settings after using the ifconfig mac address, use the ping test network is still

Available through:

Ifconfig eth0 up

Ifconfig

Ping 192.168.1.1


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[root@FriendlyARM /]# ifconfig eth0 hw ether 00:11:aa:bb:cc:dd
[root@FriendlyARM /]# ifconfig eth0 up
[root@FriendlyARM /]# ifconfig
eth0 Link encap:Ethernet HWaddr 00:11:AA:BB:CC:DD
inet addr:192.168.1.230 Bcast:192.168.1.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:60 errors:0 dropped:0 overruns:0 frame:0
TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:4791 (4.6 KiB) TX bytes:672 (672.0 B)
Interrupt:53 Base address:0x300
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
[root@FriendlyARM /]# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=3.2 ms

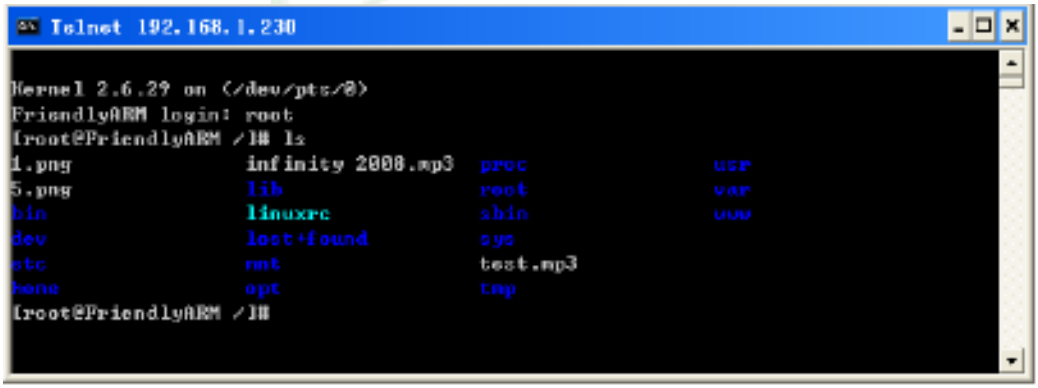
1.2.19 How to use Telnet to log on development board

Description: The system used in 6410 and 2440 part of the program effect is the same, use the following screenshot S3C2440-FA

Screenshot for reference only, subject to the actual situation.

Development board start running, in fact, has started a Telnet service, so users can log on remotely through the network board.

In the Windows command line window type "telnet 192.168.1.230", shown in the login screen, enter "root"(No password) to enter the system.



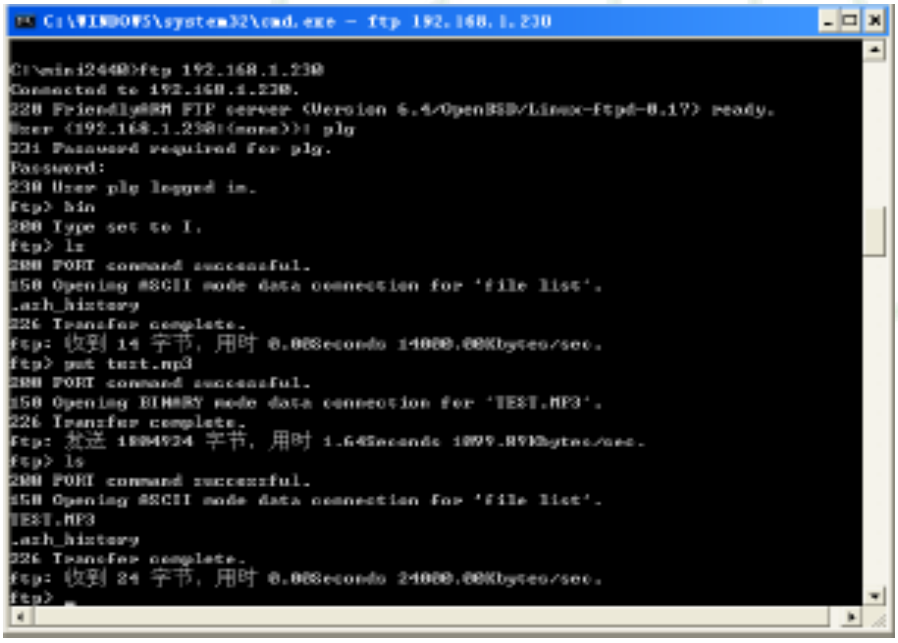
1.2.22 using ftp to transfer files

Description: The system used in 6410 and 2440 part of the program effect is the same, use the following screenshot S3C2440-FA

Screenshot for reference only, subject to the actual situation. Development board start running,in fact, has started a Telnet service, so users can

Both in the windows system or Linux system, in general, after the installation comes with a command line ftp command procedures, you can login using the remote ftp host, and transfer files, which requires the host provides ftp services and the corresponding authority; not only the development board with the ftp command, ftp also started at boot time service.To facilitate testing, we can command from the PC, log on window boards, development boards to transfer files.

Note: Make sure you have the ftp directory where the file to be uploaded, here is test.mp3 **Note: the ftp login account for the development board: plg password: plg** transfer is complete, you can see the target board's serial port terminal / home / plg directory of more than a **test.mp3** file.



1.2.23 LED control panel via the web

Description: The system used in 6410 and 2440 part of the program effect is the same, use the following screenshot S3C2440-FA

Screenshot for reference only, subject to the actual situation.The midpoint of the web server test page "Network Control LED test" item, and the LED test control page@as shown in the following picture

You can use the web in various test items for testing, one of the "LED test" will be a CGI program to control the board through the LED lights, including 2 ways to display three different display types and speeds.

If you want to stop the web server, then the command prompt, enter the following command:

 # / Etc / rc.d / init.d / httpd stopTo restart, enter:

 # / Etc / rc.d / init.d / httpd start

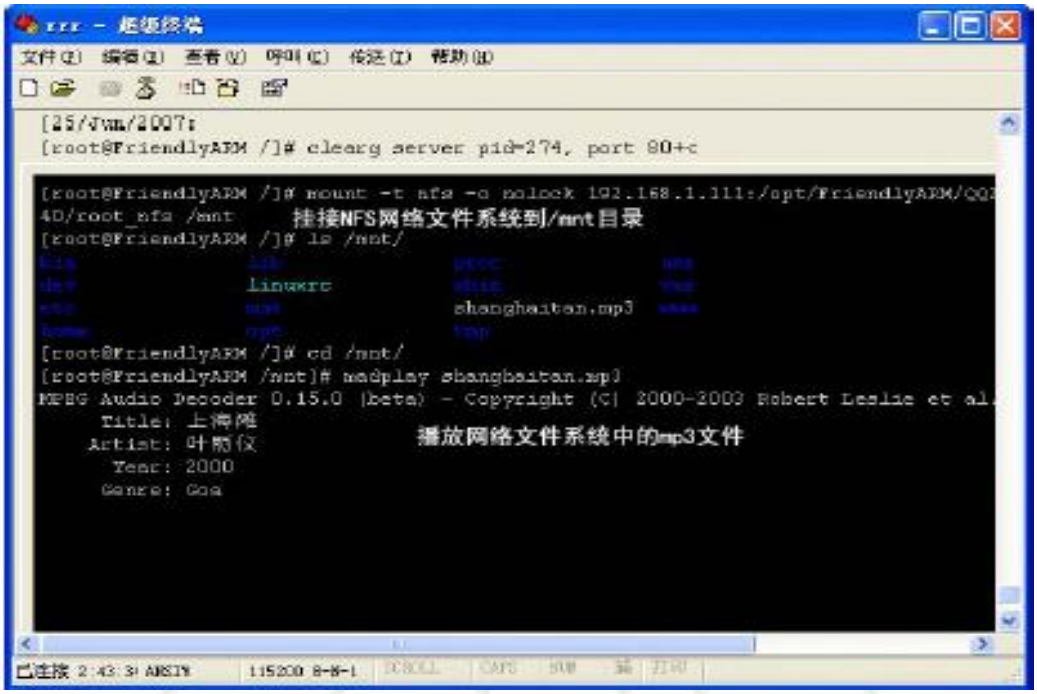
1.2.24 How to use Network File System (NFS) mount

During the test before the PC NFS server side to build a good system, then enter the following command at the command line (assuming the server's IP address is 192.168.1.111):

```
# Mount-t nfs-o nolock 192.168.1.111: / opt /S3C6410-TFA/linux/rootfs_qtopia_qt4 / mnt
```

Mount successfully, you can enter the / mnt directory operation, as shown below. Cancel the mount command as follows:

 # Umount / mnt



1.2.25 Set and save the real-time clock

Linux Change the time of the method in general use the date command, in order to S3C2440 internal clock with the linux system with clock synchronization, general use hwclock command, thefollowing is their use:

(1) date-s 042916352007 # Set time to 2007-04-29 16:34

(2) hwclock-w # to just set the internal RTC time into the S3C2440

(3).Boot using **the hwclock-s** command to restore **linux** system clock to **RTC**, generally put intothe statement

/ Etc / init.d / rcS file automatically.

Note: We offer the system has to hwclock-s command to write rcS file.

1.2.26 How to power down to save data to Flash

Because this system uses a read-write file system yaffs2 (in embedded systems, specifically the management of a Flash memory file system), so you can easily save the dynamic data is not lost after power down.Serial terminal after boot run the following command:

Cp / shanghaitan.mp3 / home / plg

At this point in / home / fa copy a directory, the same file, and then shut down, restart the system, you can view the / home / plg directory of the file still exists.

1.2.27 Set the program to run automatically boot

With the startup script can set a variety of programs to run automatically after boot, you can also set other system settings, which is somewhat similar to the **Windows** system **Autobat** automatic batch file to start the script in the board's / etc / init.d / rcS, content as follows (the actual content may not fully consistent with this):

```
#! / Bin / sh

PATH = / sbin: / bin: / usr / sbin: / usr / bin: / usr / local / bin:

runlevel = S prevlevel = N umask 022
export PATH runlevel prevlevel


#

# Trap CTRL-C & c only in this shell so we can interrupt subprocesses.

#

trap ":" INT QUIT TSTP

/ Bin / hostname


[-E / proc / 1] | | / bin / mount-n-t proc none / proc

[-E / sys / class] | | / bin / mount-n-t sysfs none / sys

[-E / dev / tty] | | / bin / mount-t ramfs none / dev

/ Bin / mount-n-t usbfs none / proc / bus / usb


echo / sbin / mdev> / proc / sys / kernel / hotplug

/ Sbin / mdev-s

/ Bin / hotplug

# Mounting file system specified in / etc / fstab mkdir-p / dev / pts
mkdir-p / dev / shm

/ Bin / mount-n-t devpts none / dev / pts-o mode = 0622

/ Bin / mount-n-t tmpfs tmpfs / dev / shm

/ Bin / mount-n-t ramfs none / tmp

/ Bin / mount-n-t ramfs none / var mkdir-p / var / empty
mkdir-p / var / log mkdir-p / var / lock mkdir-p / var / run
mkdir-p / var / tmp
```

```
Section --38-- page

/ Sbin / hwclock-s


syslogd

/ Etc / rc.d / init.d / netd start

echo ""> / dev/tty1 echo "Starting networking ..."> / dev/tty1
sleep 1

/ Etc / rc.d / init.d / httpd start

echo ""> / dev/tty1 echo "Starting web server ..."> / dev/tty1
sleep 1

/ Etc / rc.d / init.d / leds start

echo ""> / dev/tty1 echo "Starting leds service ..."> / dev/tty1
echo ""

sleep 1


echo ""> / dev/tty1

/ Etc / rc.d / init.d / alsaconf start
echo "Loading sound card config ..."> / dev/tty1 echo ""


/ Sbin / ifconfig lo 127.0.0.1

/ Etc/init.d/ifconfig-eth0


/ Bin / qtopia &
echo ""> / dev/tty1 echo "Starting Qtopia, please waiting ..."> / dev/tty1
```

1.2.28 screenshot of how to use commands

You can use the snapshot command to capture the current **LCD** display, and save it as png images.

 # Snapshot pic.png

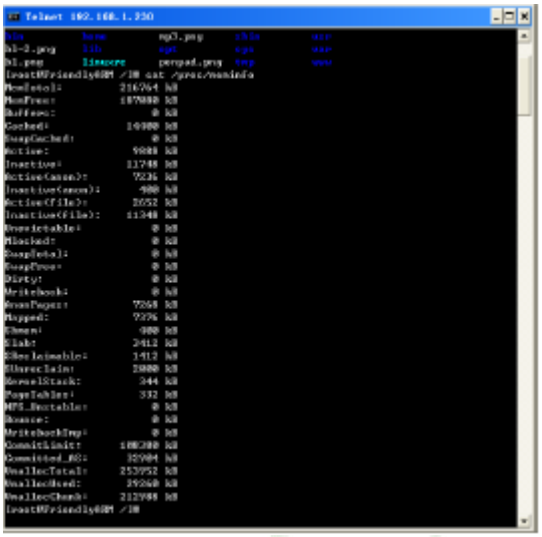
Command will execute the **LCD** display to capture current and saved as pic.png file.

1.2.29 Check the information board memory

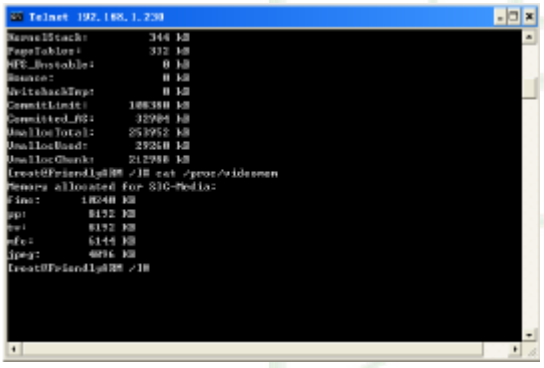
The development board equipped with a 256M DDR RAM, but is reflected in the system user to view only the total to about 68M of memory,

This is because the media-driven "eat" a lot of memory space, which we briefly explain the following: Generally, we use "cat / proc / meminfo" command system memory information, this information is only describes the whole Linux

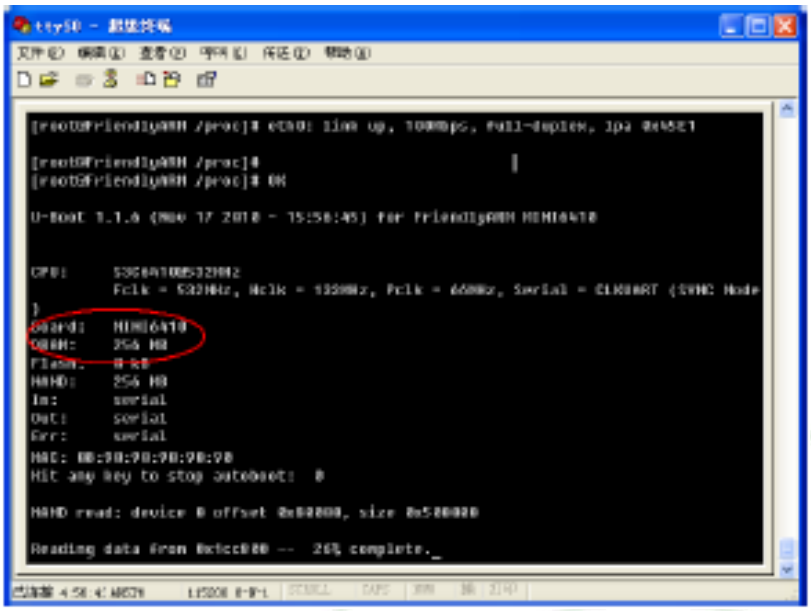
Software system that can be assigned to the total amount of memory, its results as shown below, a total of 216M or so.



In fact, the 6410 internal multimedia co-processor also uses some memory, run "cat / prov / videomem" command to see the details of memory allocation, as shown:



In the u-boot your system before you can view the actual memory size, as shown:


[root@FriendlyARM /proc]# eth0: link up, 100Mbps, full-duplex, lpa 0x45E1
[root@FriendlyARM /proc]#
[root@FriendlyARM /proc]# OK
U-Boot 1.1.6 (Nov 17 2010 - 15:56:45) for FriendlyARM MINI6410
CPU: S3C6410@533MHz
Fclk = 533MHz, Hclk = 133MHz, Pclk = 66MHz, Serial = CLK0&UART (SYNC Mode
Board: MINI6410
DRAM: 256 MB
Flash: 0 kB
NAND: 256 MB
In: serial
Out: serial
Err: serial
Net: 00:00:00:00:00:00
Hit any key to stop autoboot: 0
NAND read: device 0 offset 0x80000, size 0x500000
Reading data from 0xfcc800 -- 26% complete.

1.3 Installation and set Fedora9

This section from the virtual machine / PC installed on Fedora 9.0 started, details how to create a Linux development environment.

Our software development and testing of all development based on Fedora9 platform to do all the configuration and build scripts are based on

This platform, we have not tested on other platforms.If you are familiar with Linux development Hen, I believe you will find step by step according to error causes and solutions, they generally lack the platform you use some libraries or tools and other causes; Otherwise, we recommend beginners to use and we agreed platform, that Fedora 9 **(full name: Fedora-9-i386-DVD.iso), you can download on its official website (ftp://download.fedora.redhat.com/pub/fedora/linux/releases/9 / Fedora/i386/iso/Fedora-9-i386-DVD. Iso**, does not guarantee long-term effective), you can get in other places, they are the same, be sure to refer to our installation manual provides step, which is the result of rigorous testing, so as not to miss some of the development of the group when needed pieces.

Many **Linux** distributions, we can not write this document explains installation of eleven, please understand.

Why do we choose **Fedora 9:**

According to our tests, **Fedora 9** after a relatively simple installation and setup, you can still use the root user (most developers require this user right), **Fedora 10** and later versions were set to go through a little complicated to use root, This is not conducive to the beginners do not understand Linux, Fedora 8 and earlier versions are relatively old and some of it.And according to our manual provides steps to install **Fedora 9**, you can provide us with a more perfect development package, no additional patches like the complicated settings (**ubuntu** you need to frequently update the settings), so we believe that **Fedora 9** is the most suitable development platform for beginners.

1.3.1 graphical installation of Fedora 9.0

Step1: the installation CD into the drive, the **BIOS** to boot from the CD and boot the system the following screen will appear, press Enter to continue.

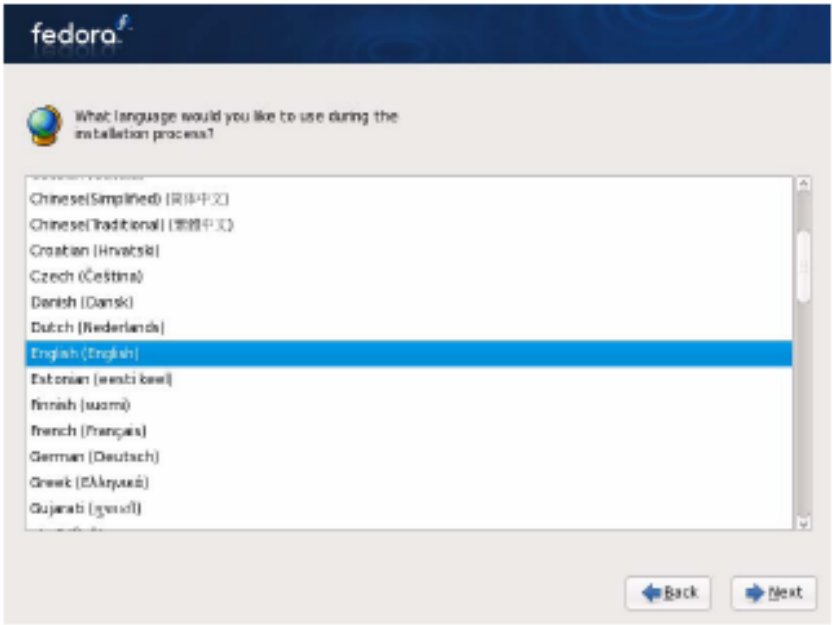
Welcome to Fedora 9!
Install or upgrade an existing system
Install or upgrade an existing system (text mode)
Rescue installed system
Boot from local drive
Memory test
Press [Tab] to edit options
Automatic boot in 59 seconds...
fedora

Step2: Then enter the next step, check the installation disk, generally do not need testing, so I chose to Skip (Skip)

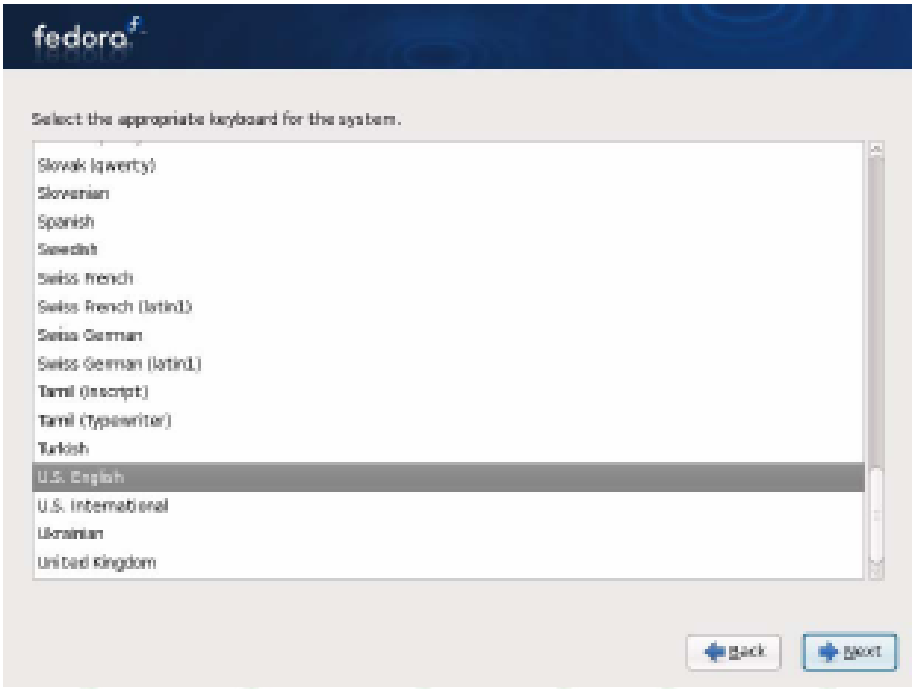
Welcome to Fedora for i386
Disc Found
To begin testing the media before installation press OK.
Choose Skip to skip the media test and start the installation.
OK
Skip
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

Step3: After a while you enter the installation graphical screen, click Next to.

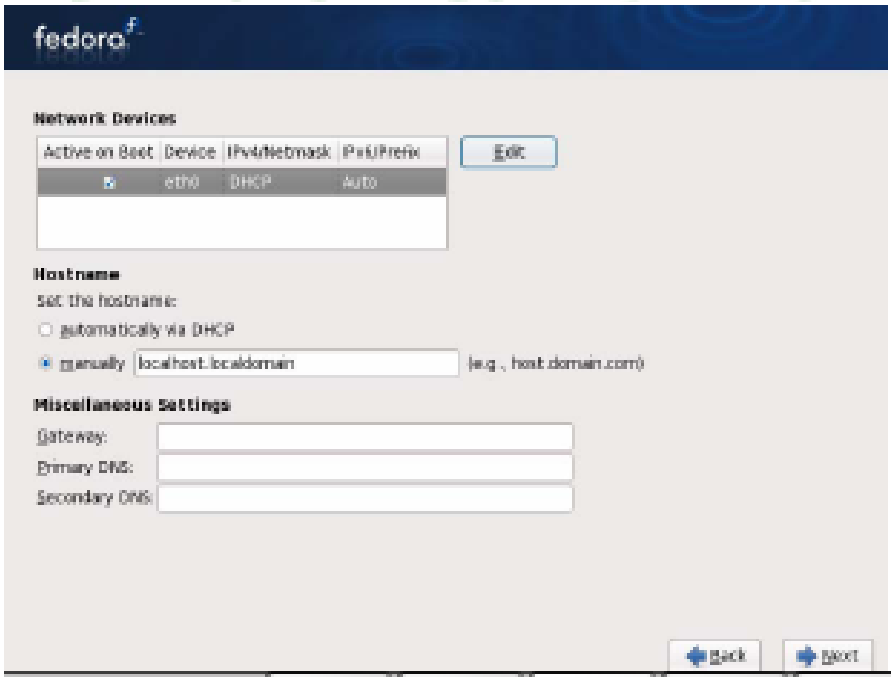
Step4: Select the installation process what language, where choice is English



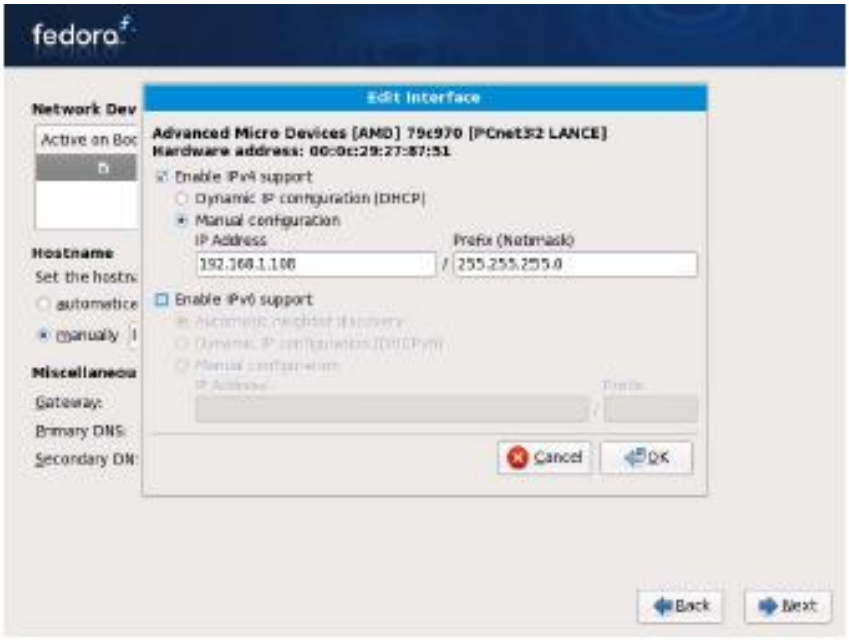
Step5: Select the keyboard, we can generally beauty-style keyboard



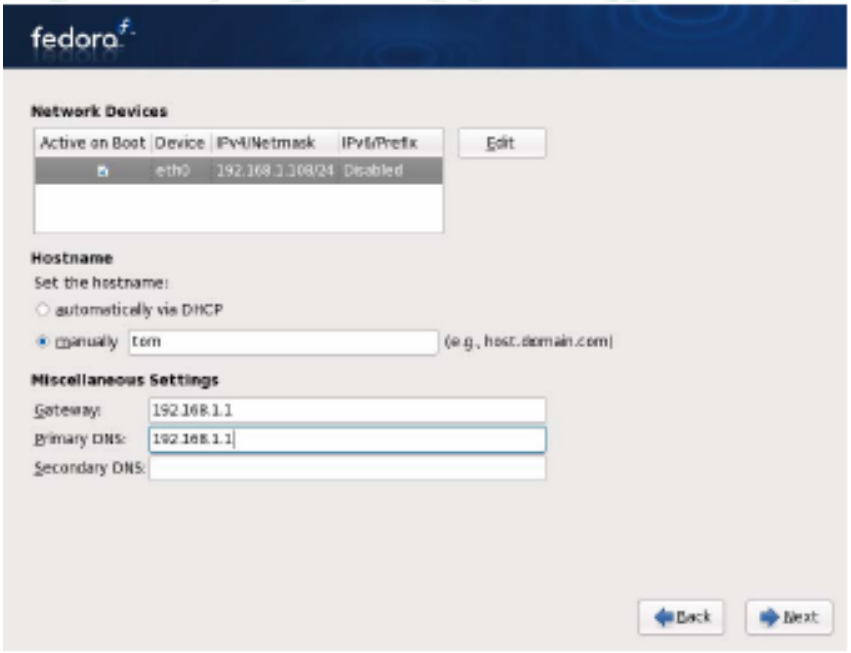
Step6: Start Settings Network



Point "Edit" button, do not set to DHCP, we generally use a static IP, to fill out below the control, respectively, enter the IP and subnet mask

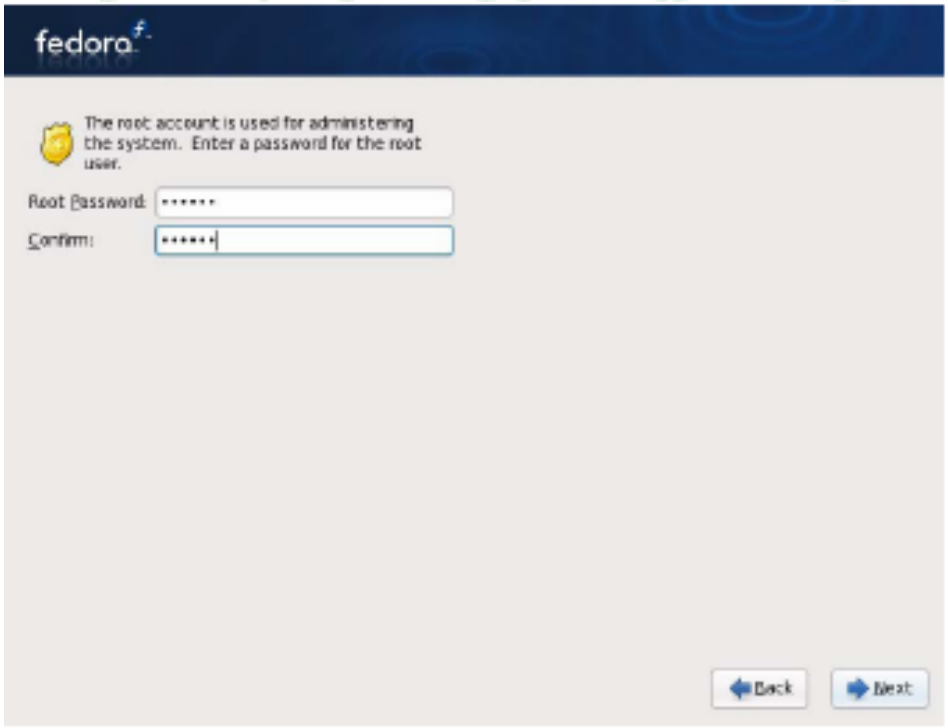


Click "OK" to return to begin setting up the machine name and the gateway, and DNS, etc.

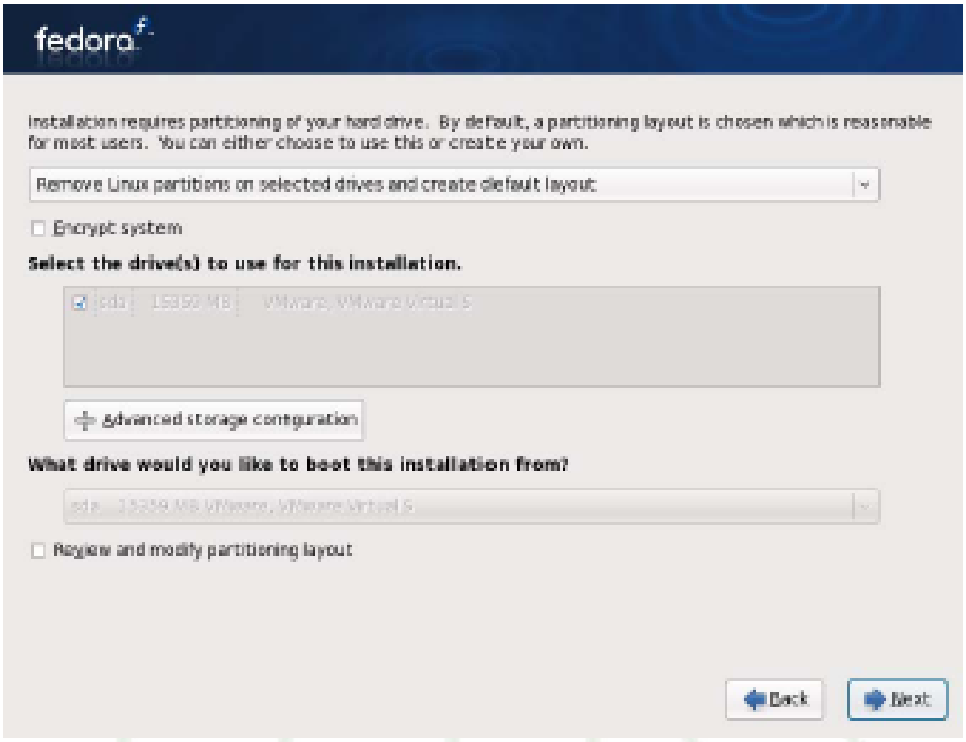


Step7: Set time zone, if you do not use virtual machine installation, "System clock uses UTC" option can be removed, as shown in Figure

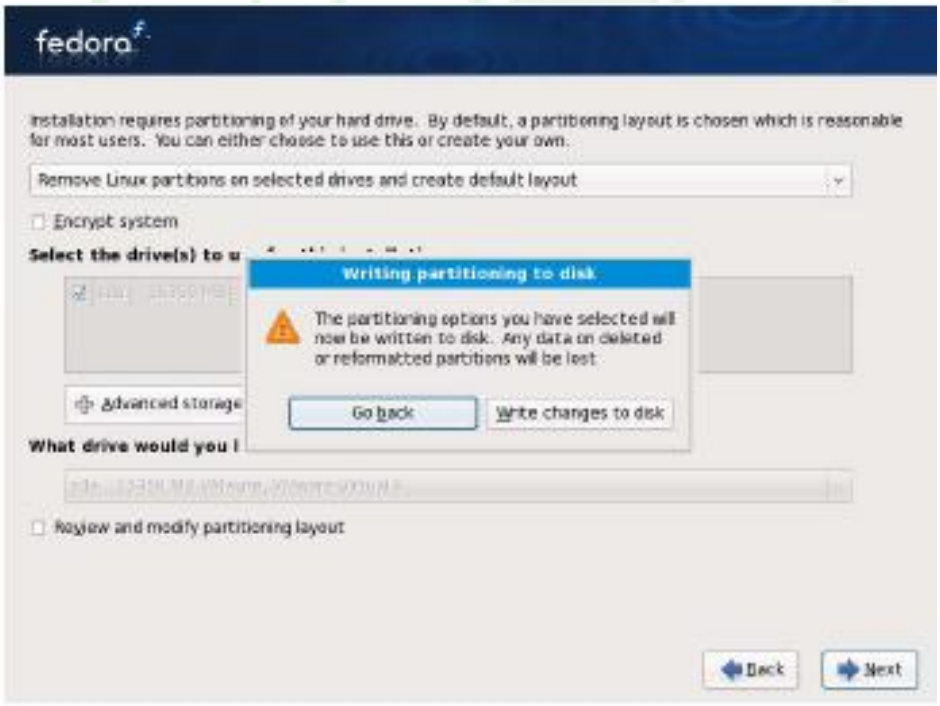
Step8: Set the root user password must be six digits or more.



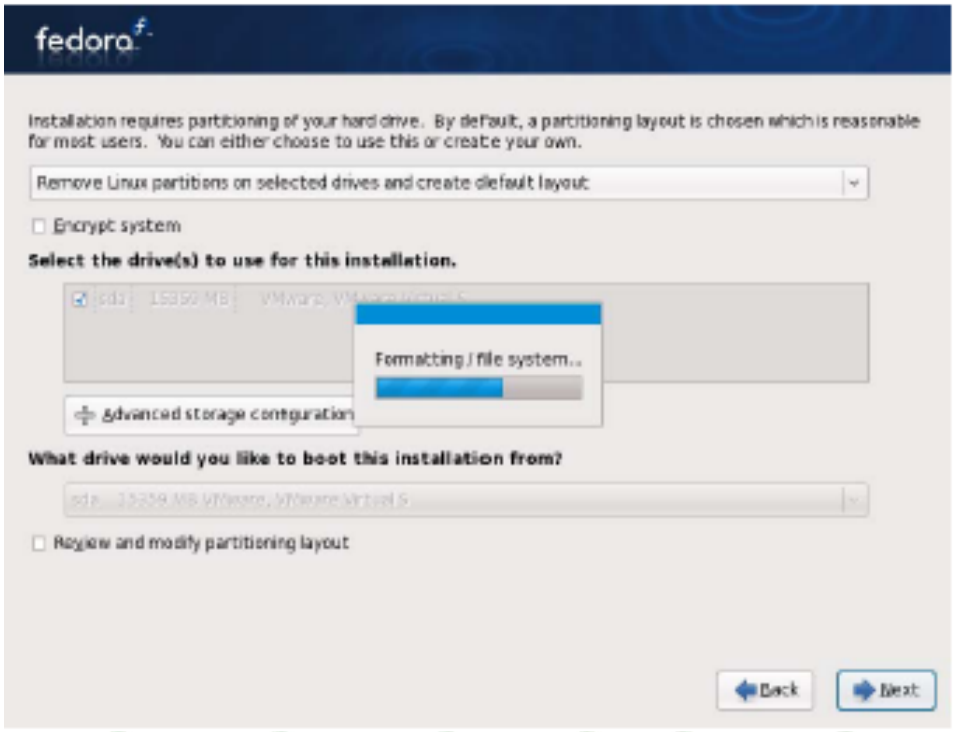
Step9: Set partition, you can usually choose the default, pay attention to hard data to back up


fedora
Installation requires partitioning of your hard drive. By default, a partitioning layout is chosen which is reasonable for most users. You can either choose to use this or create your own.
Remove Linux partitions on selected drives and create default layout
Encrypt system
Select the drive(s) to use for this installation.
Advanced storage configuration
What drive would you like to boot this installation from?
Review and modify partitioning layout
Back
Next

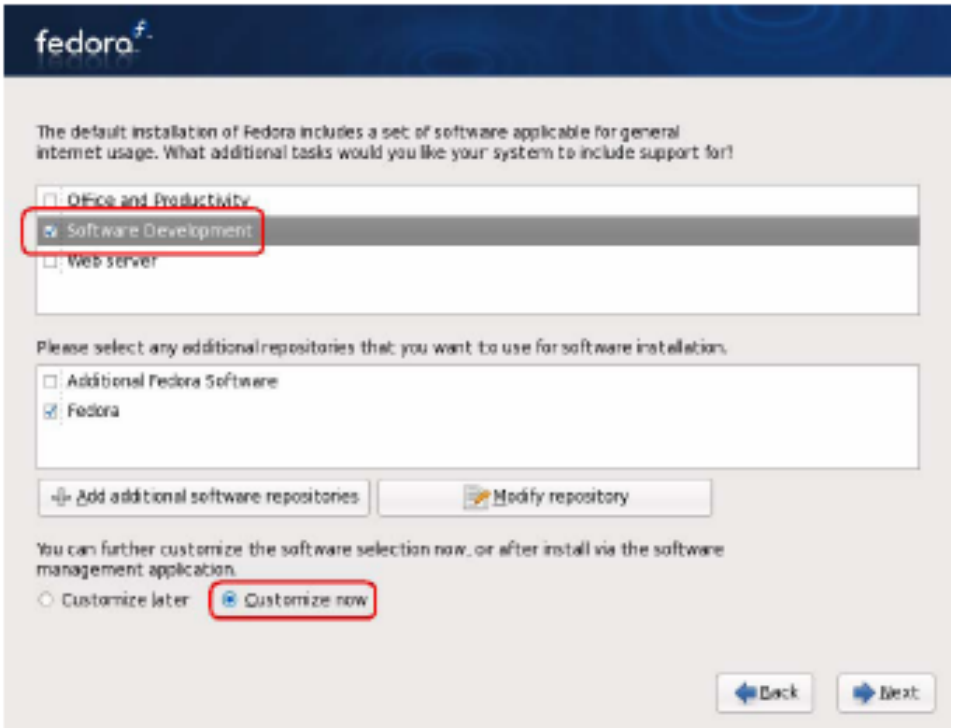
, "Next" warning message will appear telling you to format the partition will continue to implement all of the data, we generally use in Vmware virtual machine, so you can choose "Write changes to disk", thenstart formatting.


fedora
Installation requires partitioning of your hard drive. By default, a partitioning layout is chosen which is reasonable for most users. You can either choose to use this or create your own.
Remove Linux partitions on selected drives and create default layout
Encrypt system
Writing partitioning to disk
The partitioning options you have selected will now be written to disk. Any data on deleted or reformatted partitions will be lost.
Go Back
Write changes to disk
Review and modify partitioning layout
Back
Next

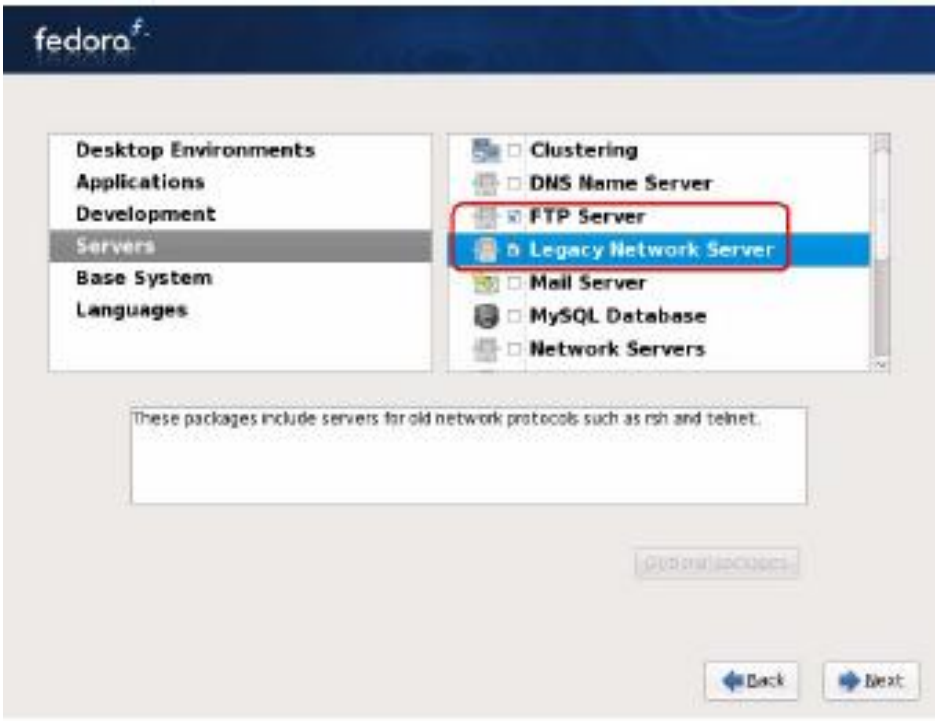
This is the format process diagram:


fedora
Installation requires partitioning of your hard drive. By default, a partitioning layout is chosen which is reasonable for most users. You can either choose to use this or create your own.
Remove Linux partitions on selected drives and create default layout
Encrypt system
Select the drive(s) to use for this installation.
Formatting / file system...
Advanced storage configuration
What drive would you like to boot this installation from?
Review and modify partitioning layout
Back
Next

Step11: Select the installation type, select the figure, point "Next" start customization.

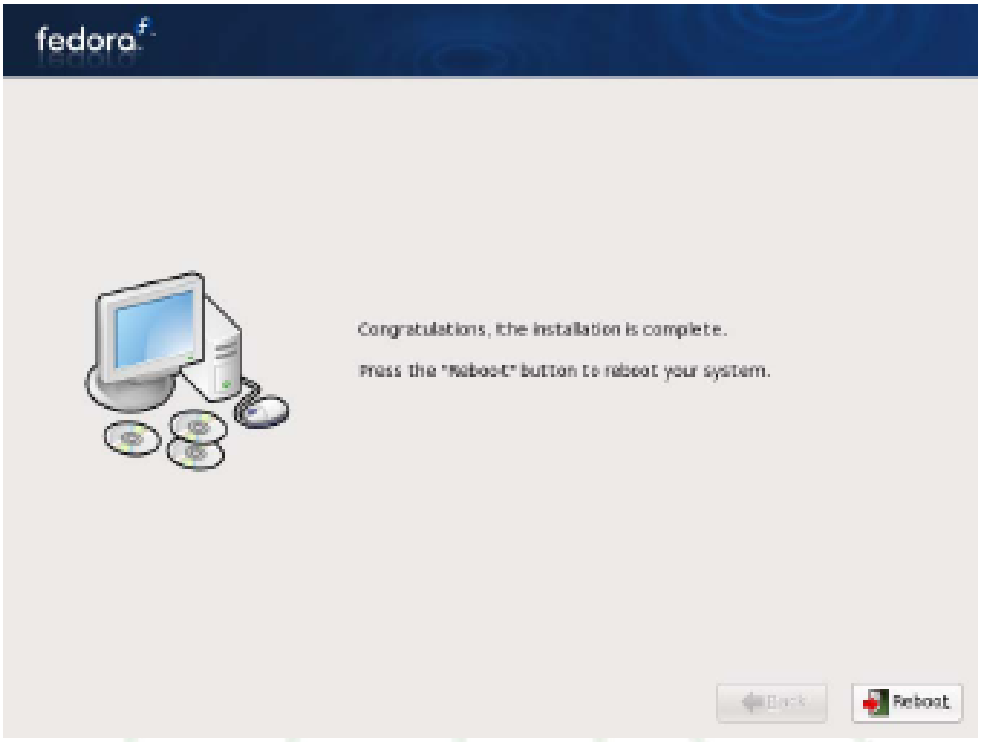

fedora
The default installation of Fedora includes a set of software applicable for general internet usage. What additional tasks would you like your system to include support for?
Office and Productivity
Software Development
Web server
Please select any additional repositories that you want to use for software installation.
Additional Fedora Software
Fedora
Add additional software repositories
Modify repository
You can further customize the software selection now, or after install via the software management application.
Customize later
Customize now
Back
Next

Step12: In the Servers item, select Figure



Step13: to install the system, the process time will be longer, please be patient.

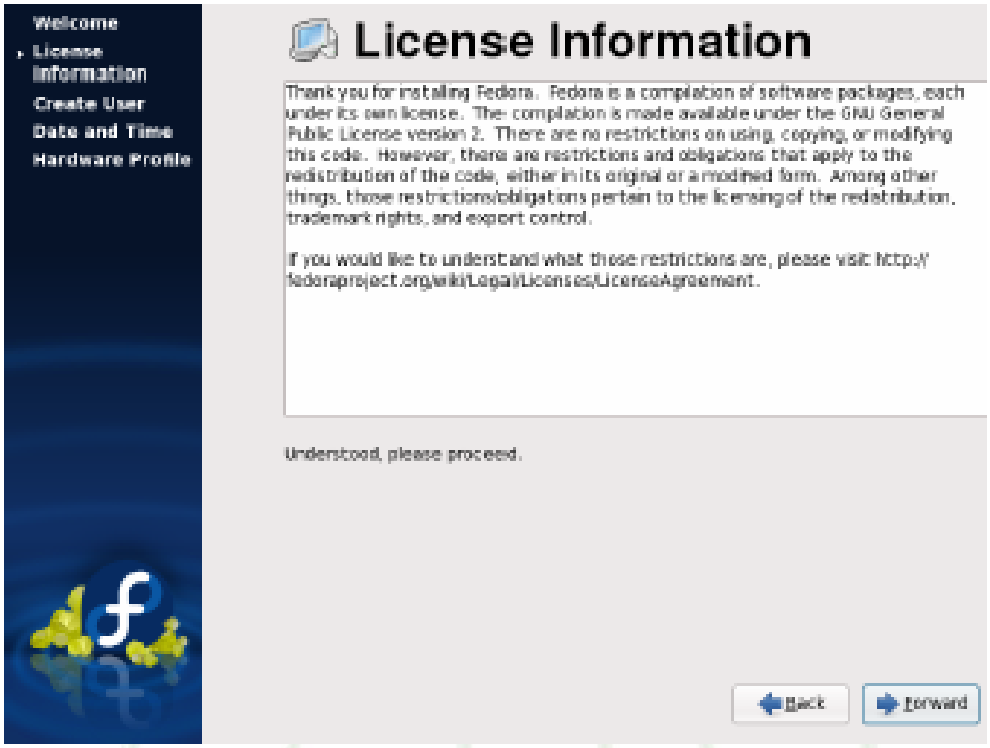
Step14: installed, as shown in Figure



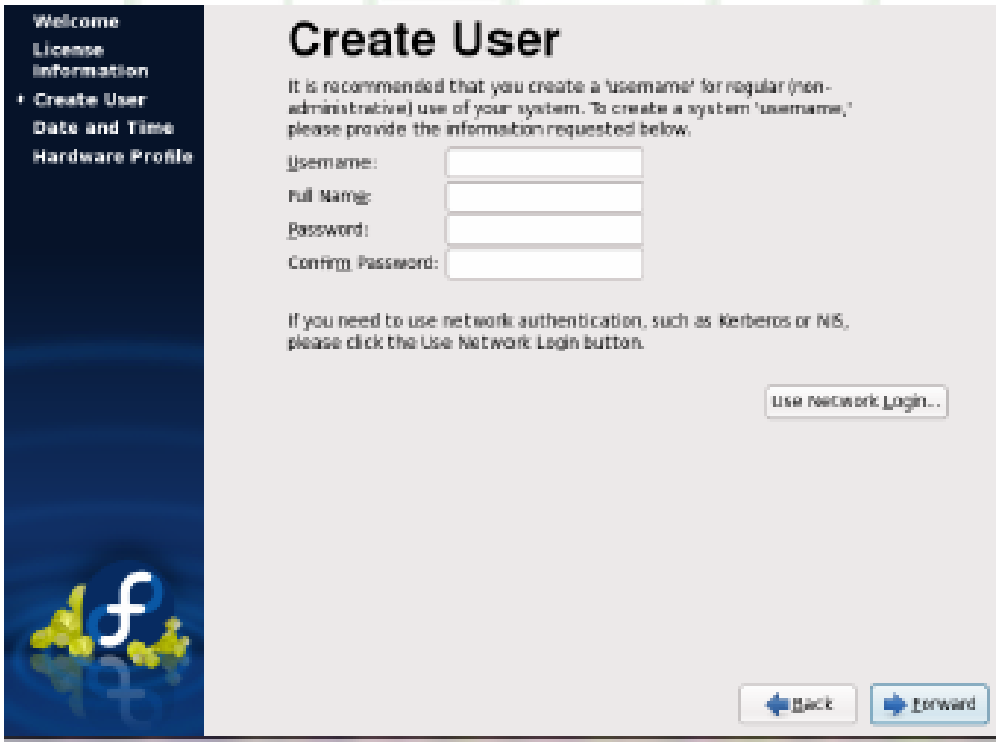
Step15: connected to the step, according to the "Reboot" button to restart the system, appears for the first time using the interface, as shown.

Welcome
License Information
Create User
Date and Time
Hardware Profile
Welcome
There are a few more steps to take before your system is ready to use.
The Setup Agent will now guide you through some basic configuration.
Please click the "Forward" button in the lower right corner to continue
fedora
Forward

Step16: Some license information, do not bother to continue to the next step


Welcome
License Information
Create User
Date and Time
Hardware Profile
License Information
Thank you for installing Fedora. Fedora is a compilation of software packages, each under its own license. The compilation is made available under the GNU General Public License version 2. There are no restrictions on using, copying, or modifying this code. However, there are restrictions and obligations that apply to the redistribution of the code, either in its original or a modified form. Among other things, those restrictions/obligations pertain to the licensing of the redistribution, trademark rights, and export control.
If you would like to understand what those restrictions are, please visit http://fedoraproject.org/wiki/Legal/Licenses/LicenseAgreement.
Understood, please proceed.
Back
Forward

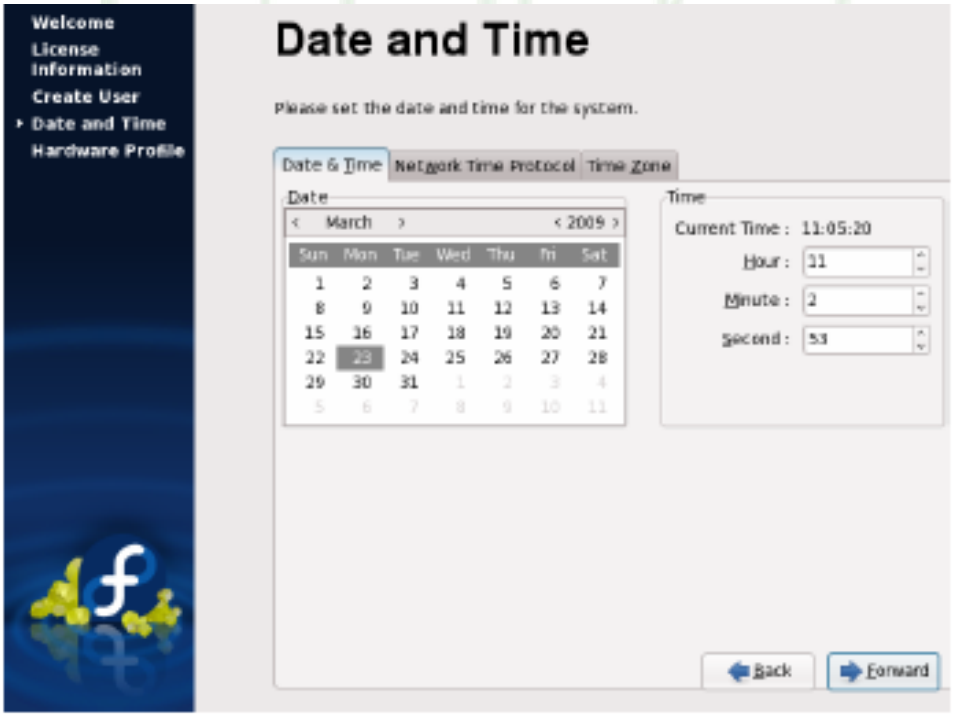
Step17: Create a user, in this we do not need to create any new user, point "Forward" to continue


Welcome
License Information
Create User
Date and Time
Hardware Profile
Create User
It is recommended that you create a 'username' for regular (non-administrative) use of your system. To create a system 'username,' please provide the information requested below.
Username:
Full Name:
Password:
Confirm Password:
If you need to use network authentication, such as Kerberos or NIS, please click the Use Network Login button.
Use Network Login...
Back
Forward

Then you will be prompted to confirm that point "Continue" to proceed.

Welcome
License Information
Create User
Date and Time
Hardware Profile
Create User
It is recommended that you create a 'username' for regular (non-administrative) use of your system. To create a system 'username,' please provide the information requested below.
Username:
Full Name:
Password:
Confirm Password:
It is highly recommended that a personal user account be created. If you continue without an account, you can only log in with the root account, which is reserved for administrative use only.
Continue
Create account
Use Network Login...
Back
Forward

Step18: Set the date and time, do not bother to continue to the next step



Step19: lists some of the machine hardware information, use the default setting, points "Finish"

Welcome
License Information
Create User
Date and Time
Hardware Profile
Hardware Profile
Smolt is a hardware profiler for The Fedora Project. Submitting your profile is a great way to give back to the community as this information is used to help focus our efforts on popular hardware and platforms. Submissions are anonymous. Sending your profile will enable a monthly update.
UUID: 0895b853-99d0-47d7-85dc-07c9815d24eb
OS: Fedora release 9 (Sulphur)
Default run level: 5
Language: en_US.UTF-8
Platform: i686
BogoMIPS: 3330.46
CPU Vendor: GenuineIntel
CPU Model: Intel(R) Core(TM)2 CPU T5500 @ 1.66GHz
Number of CPUs: 1
CPU Speed: 1661
System Memory: 1038
System Swap: 1983
Vendor: VMware, Inc.
System: VMware Virtual Platform None
Form factor: unknown
Kernel: 2.6.25-14.fc9.i686
SELinux Enabled: True
SELinux Policy: targeted
Send Profile
Do not send profile
Back
Finish

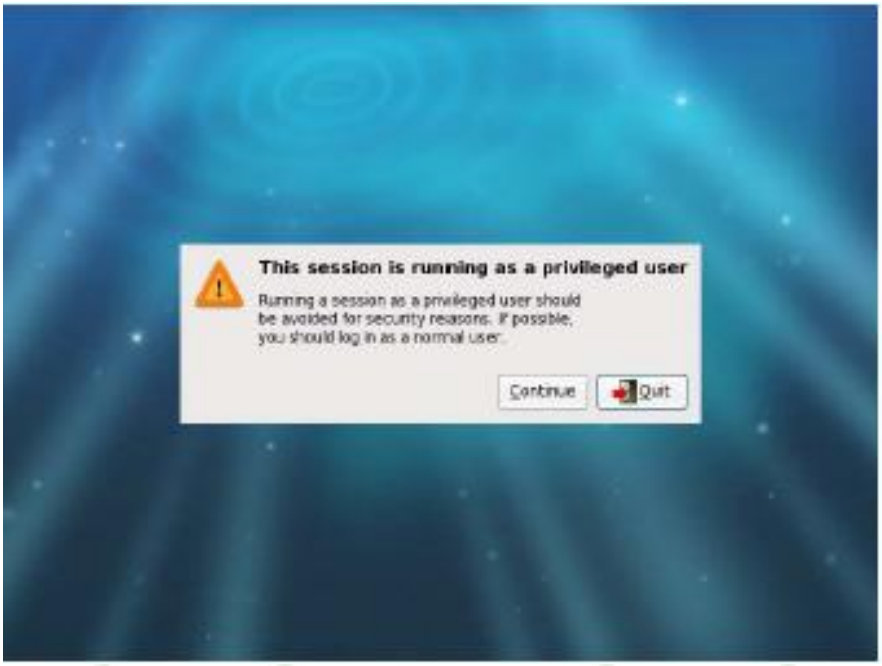
Prompted, as shown in Figure choose, the next step

Welcome
License Information
Create User
Date and Time
Hardware Profile
Hardware Profile
Smolt is a hardware profiler for The Fedora Project. Submitting your profile is a great way to give back to the community as this information is used to help focus our efforts on popular hardware and platforms. Submissions are anonymous. Sending your profile will enable a monthly update.
UUID: 0895b853-99d0-47d7-85dc-07c9815d24eb
OS: Fedora release 9 (Sulphur)
Default run level: 5
Language: en_US.UTF-8
Are you sure you wouldn't like to send the profile? Submitting your profile is a valuable source of information for our development and can help troubleshoot issues that may come up with your hardware.
Reconsider sending
No, do not send.
GHz
Form factor: unknown
Kernel: 2.6.25-14.fc9.i686
SELinux Enabled: True
SELinux Policy: targeted
Send Profile
Do not send profile
Back
Finish

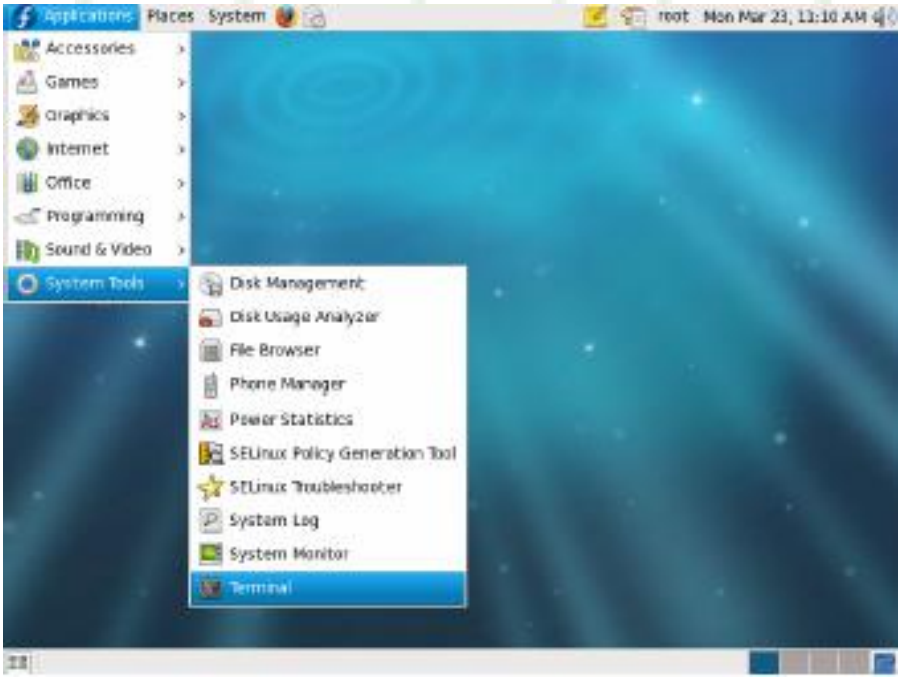
Step20: the login screen, we have to log in as root, so first type root

Just set the password and then enter

There will be a login prompt, after you log in as root, the prompt will appear each time, each time point **"Continue"** to.


This session is running as a privileged user
Running a session as a privileged user should be avoided for security reasons. If possible, you should log in as a normal user.
Continue
Quit

This is a login interface, and Windows or Ubuntu it is very similar.

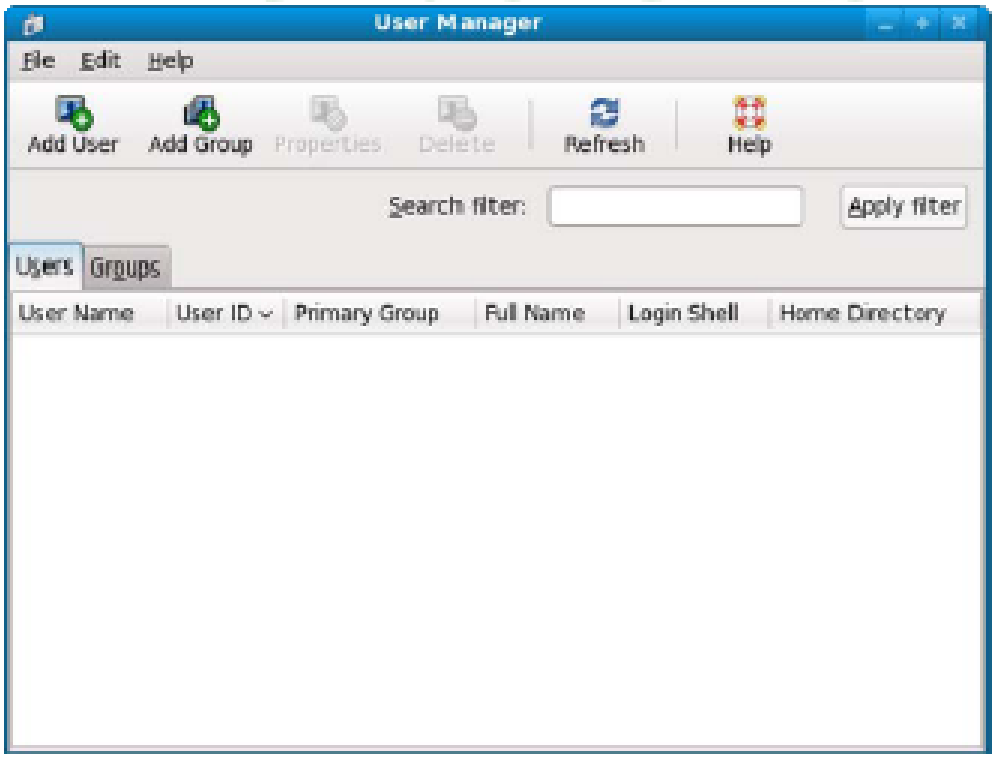


1.3.2 Adding a new user

In order to facilitate the development, we usually create a normal user privileges, as follows.

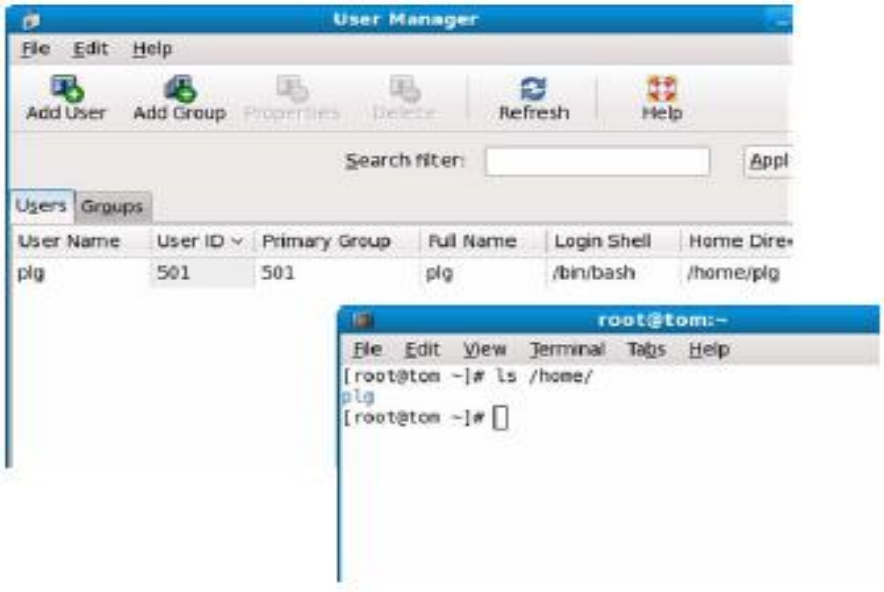
Step1: Open the Users and Groups in Figure manager:

Step2: User Management window appears



Step3: Point toolbar "Add User" button to add a new user, and password:

Click **"OK"** to return, you can see has increased plg users, while the / home directory also increased plg user directory, as shown:

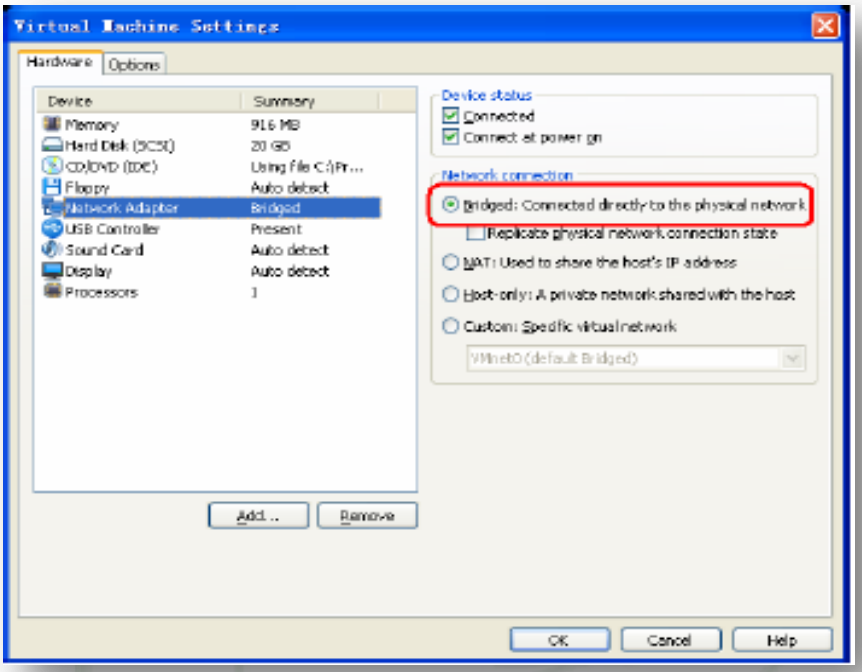


Point the Add User button, Add New User window, according to the prompts on it.

1.3.3 access to Windows system files

Whether you are using a virtual machine or a real Fedora9 system can Hen convenient access to Windows shared files, provided that the network between the two systems are interconnected.

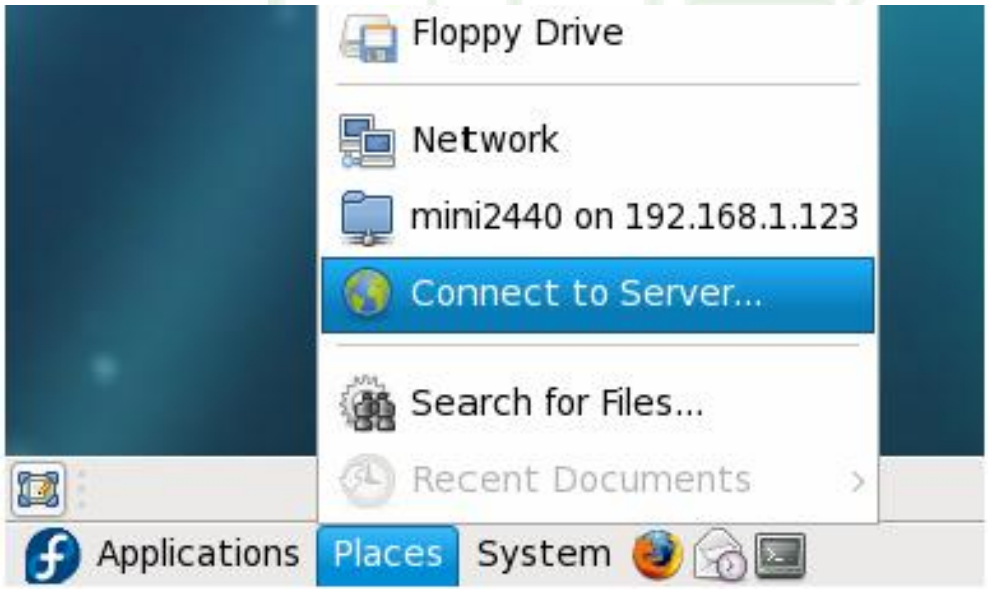
Tip: To use the network in a virtual machine, the easiest way is to set up "Guest" as the "Bridges" means the network connection, as shown:



Access shared files on Windows systems, follow these steps:

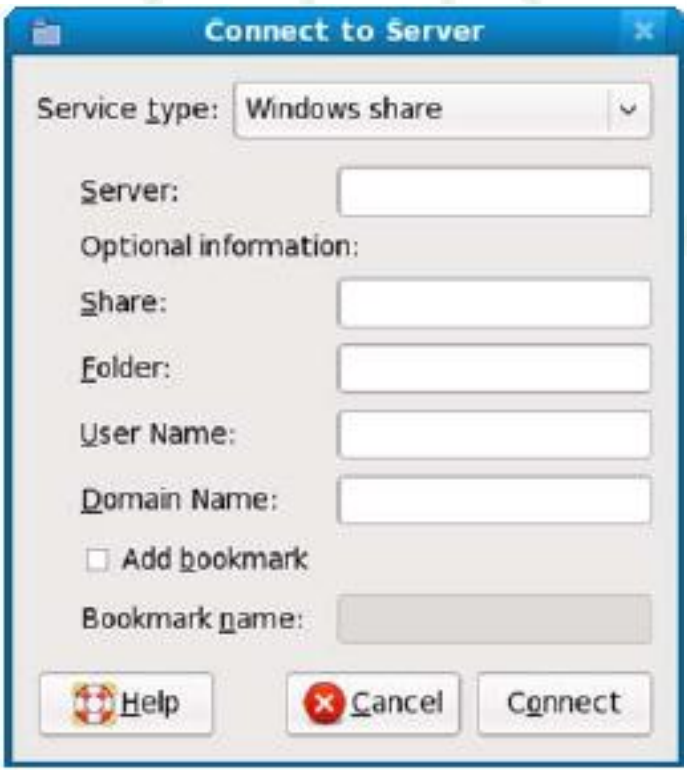
Step1: Setting in Windows shared folder "share_f9" (example)

Step2: Figure in Fedora9 operating system:

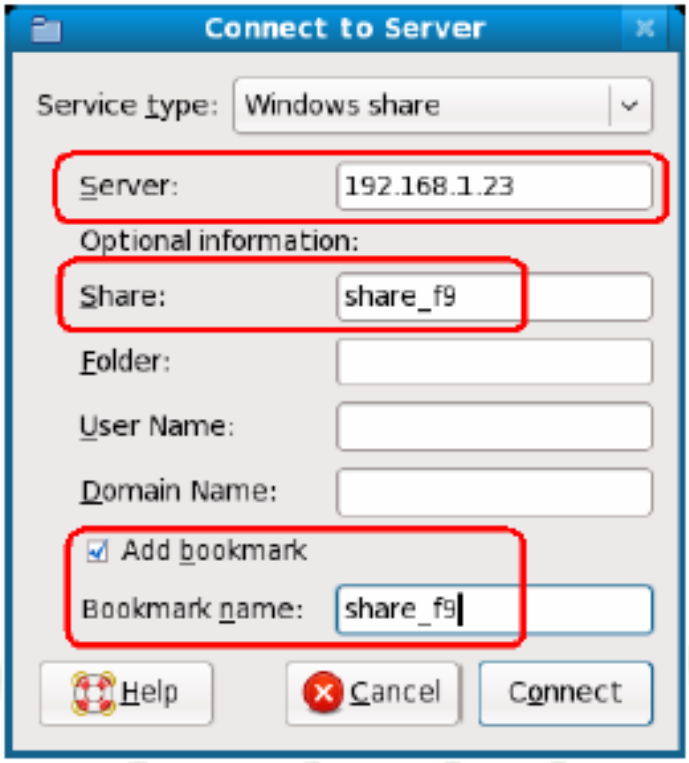


Open the window shown in Figure:

In the Service type list, select **Windows share**, as shown:

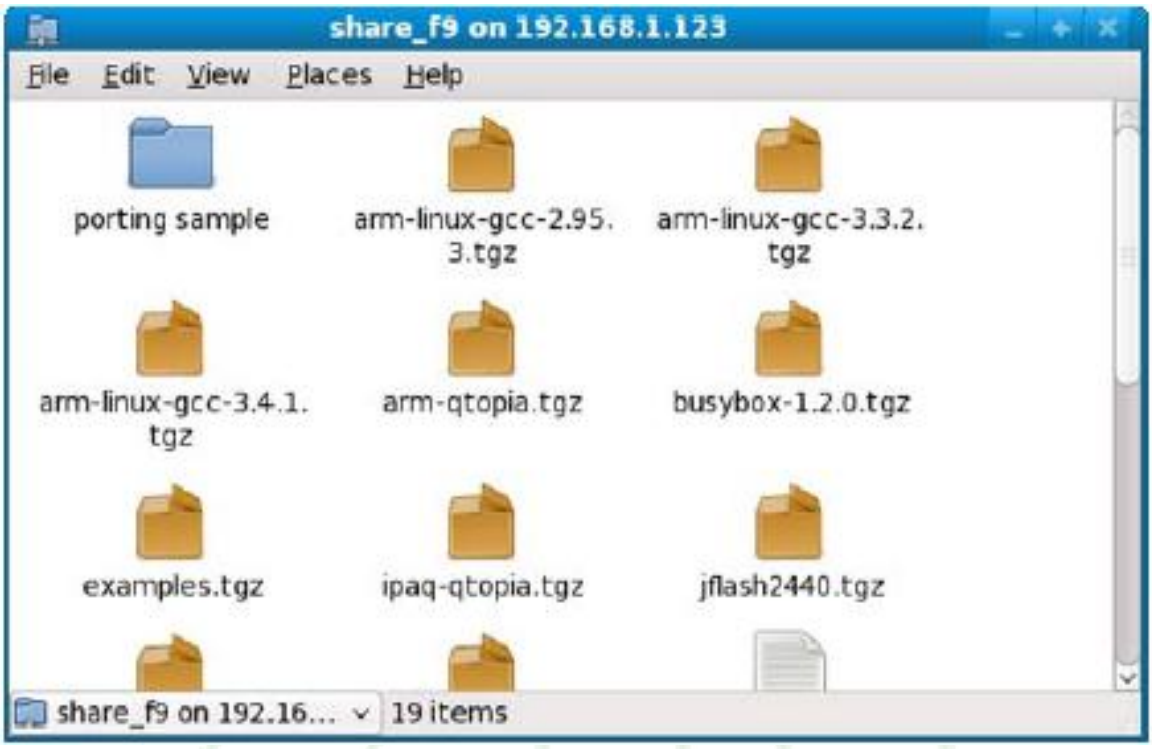


Enter the **Windows** host to share the IP address and shared folder name:

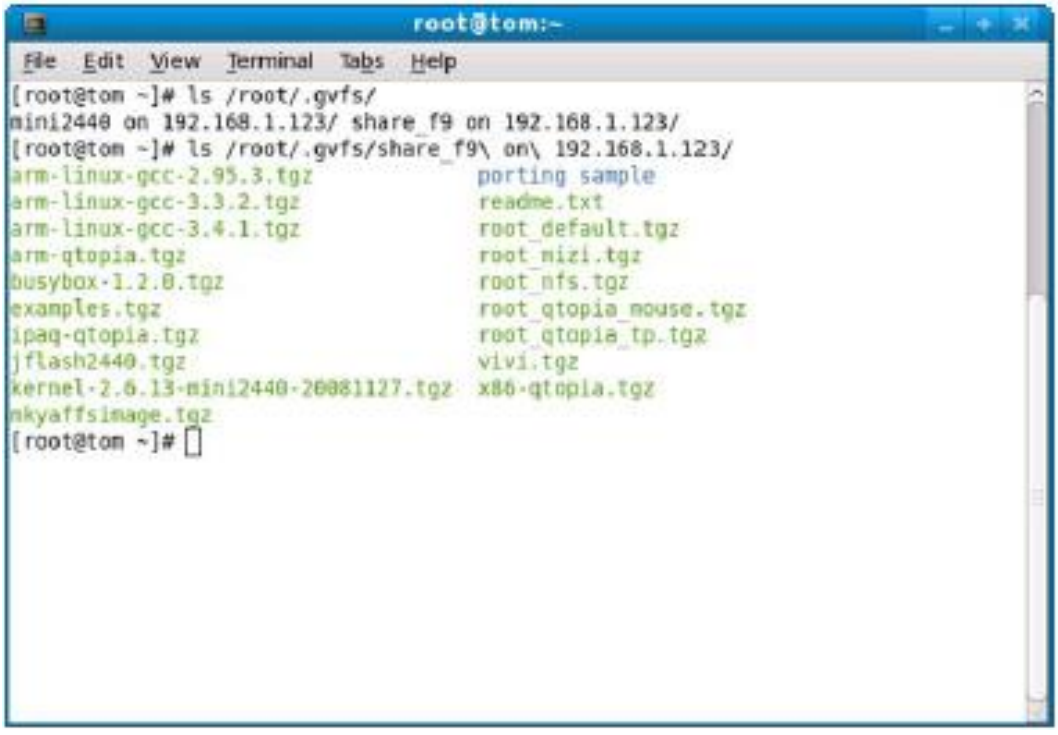


Point "Connect", the following prompt will appear:

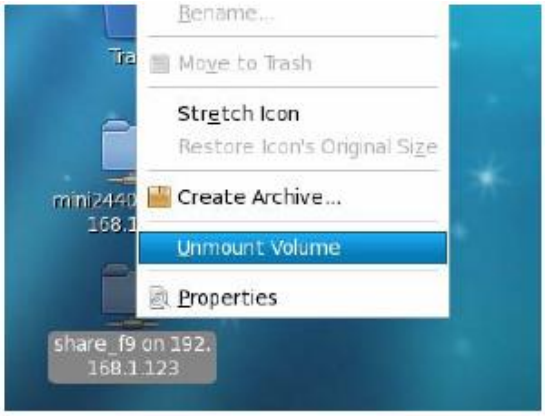
Without regard to a direct point of "Connect" to, you can see that Windows share the contents of the file, you can operate in other directories, like to use it.



If you want to use the directory on the command line, you can do this: Description: In the console, TAB key is a good use of the tips.



To disconnect the shared directory, as long as the shared folder on the desktop shown on the right operation on it:



1.3.4 Configuring Network File System (NFS) services

Developed using the development board to do, NFS service is not necessary because NFS is mainly used to share files remotely over the network, we use the common ftp or SD card, you can basically achieve the same purpose.

NFS service for any contact with Linux in terms of people may be more difficult to understand, in addition, each person's network environments are not the same, so the set up and use, and there is no strict standards, which lead to more difficult for beginners to master, so we not recommended, the steps provided in this reference; In fact, there are many fans on the network according to their own lessons learned from the case record, you can also take a look at their search, key words are "S3C2440-FA nfs", they are similar, and can be applied to 6410 systems.

Step1: Set up a shared directory

Log in as root Fedora9, in the command line:

Gedit / etc / exports

Edit the nfs service configuration file (Note: When you first open the file is empty), add the following:

/ Opt /S3C6410-TFA/linux/root_qtopia_qt4 * (rw, sync,no_root_squash)Wherein:

/ Opt /S3C6410-TFA/linux/root_qtopia_qt4 that will be shared directory, it can serve as a development board through nfs mount the root file system;

* Indicates that all clients can mount this directory

rw mount the directory that the client has read and write authority to the directoryno_root_squash mount this directory that allows clients to enjoy the host root,Description: This directory is not yet actually exist, executed after the content section 4.4 will have, but in this first set it.

Step2: Start the NFS service

Through the command line and graphical interface are two ways to start the NFS service, we aim to establish NFS service is provided outside the network shared directory services, but the default installation of Fedora on a firewall system, which will lead to the NFS service does not work properly.So turn off the firewall, the command line, enter "lokkit" command, open fire prevention setting interface:

root@tom:~
File Edit View Terminal Tabs Help
system-config-firewall
Firewall Configuration
A firewall protects against unauthorized network intrusions. Enabling a firewall blocks all incoming connections. Disabling a firewall allows all connections and is not recommended.
Firewall: ( ) Enabled (*) Disabled
OK
Customize
Cancel
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

Choose one (*) Disabled, and then select "OK" to exit, so that the permanent closure of the firewall. Thefollowing method is to start the NFS service and steps:

(1) through the commands to start and stop the nfs service run from the command line:
 # / Etc / init.d / nfs start

This will start the nfs service, you can enter the following command to verify whether the service nfsstart.

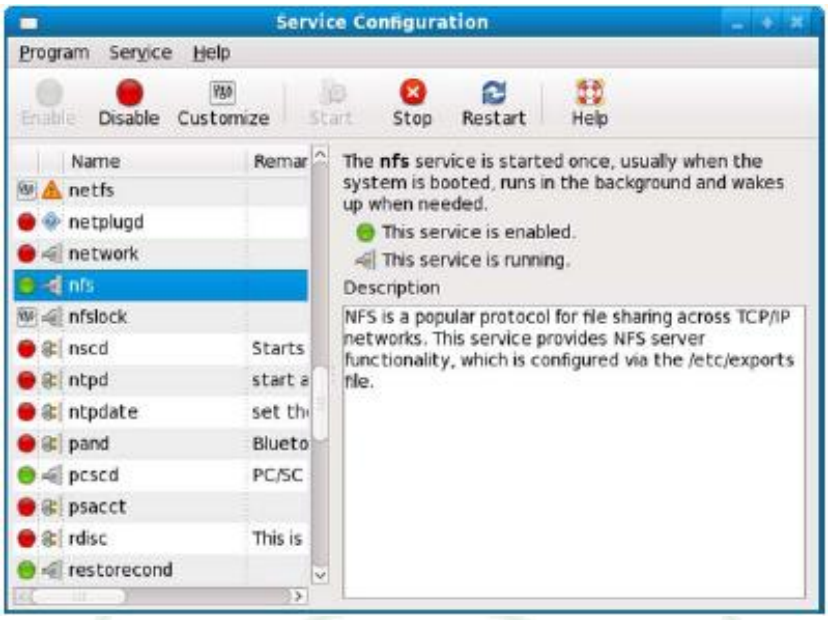
 # Mount-t nfs localhost: / opt /S3C6410-TFA/root_qtopia_qt4 / mnt /

If no error message, you will be able to browse to the / mnt directory contents and

/ Opt /S3C6410-TFA/root_qtopia_qt4 is the same. Use this command to stop the nfs service:

 # / Etc / init.d / nfs stop through the graphical interface in order to start the NFS services are automatically every time you boot the system to start the service, you can enter**# Serviceconf**

Open System Services Configuration window, in the left column to find the nfs service option box, and select it, then the toolbar **"Enable"** to start it, as shown in Figure.


Service Configuration
Program Service Help
Enable Disable Customize Start Stop Restart Help
Name Remar
netfs
netplugd
network
nfs
nfslock
nscd Starts
ntpd start a
ntpdate set th
pand Blueto
pcscd PC/SC
psacct
rdisc This is
restorecond
The nfs service is started once, usually when the system is booted, runs in the background and wakes up when needed.
This service is enabled.
This service is running.
Description
NFS is a popular protocol for file sharing across TCP/IP networks. This service provides NFS server functionality, which is configured via the /etc/exports file.

Step3: Start the system via NFS

When set up and start the NFS service, we can put NFS as root file system to start a development board. By using NFS as the root file system, the development board of the "hard" can become very large, because you are using a host's hard disk, which is frequently used to use Linux as a developmentmethod.

Set up the development board to SDBOOT start, attention to the need to enter the menu mode **(see 2 "Brush Guide")**, connect the power supply, serial cable, network cable; open the serial port terminal, enter the following command (without the quotes):

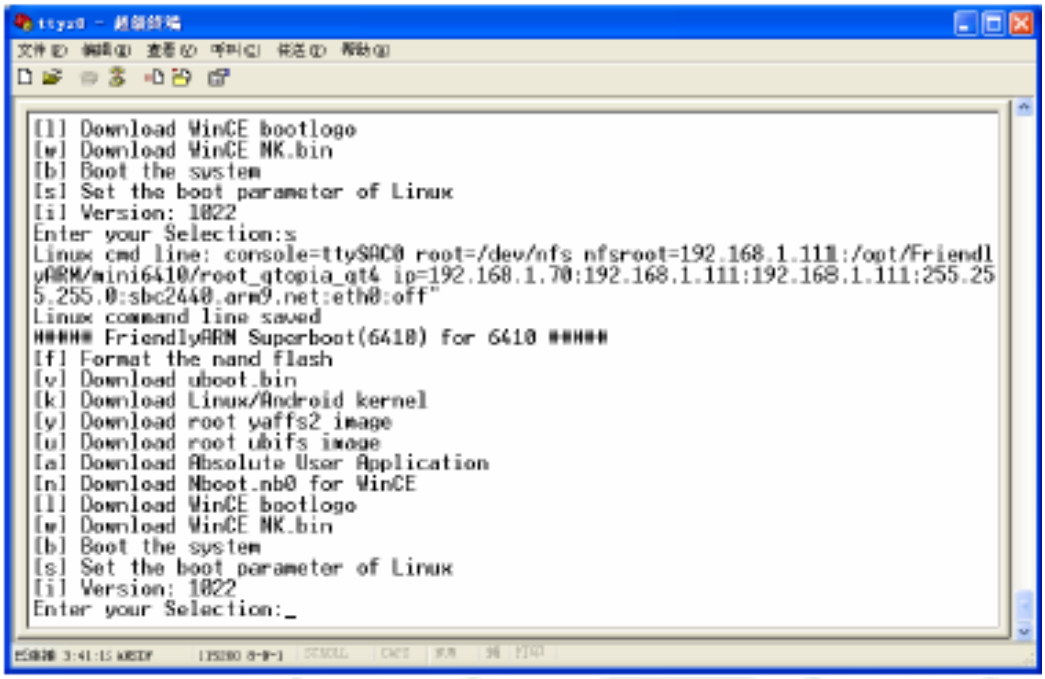
```
console = ttySAC0 root = / dev / nfs nfsroot = 192.168.1.111: / opt /S3C6410-TFA/root_qtopia_qt4 ip = 192.168.1.70:192.168.1.111:192.168.1.111:255.255.255.0: S3C6410-TFA.arm9.net: eth0: off
```

The meaning of each parameter is as follows:nfsroot is the development of the host's IP address, if you use a virtual machine, the address of the virtual machine Fedora9

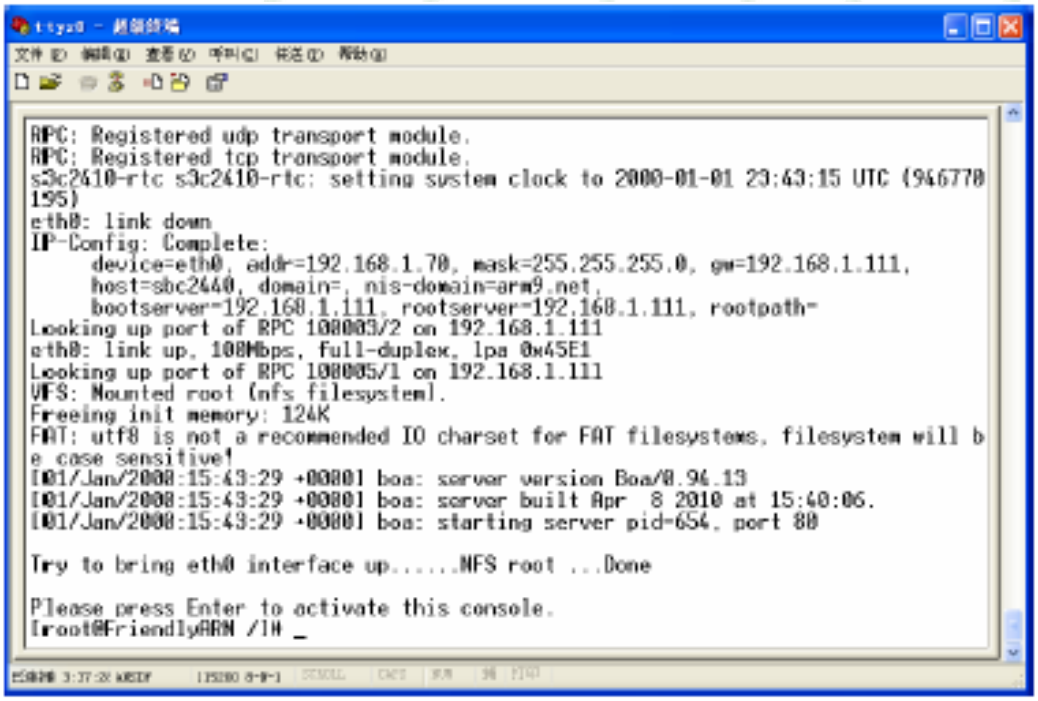
IP address, in short, it is the direct NFS service IP address of the Linux system. "Ip =" back:

The first (192.168.1.70) is a temporary target board IP (be careful not to other IP and LAN conflict); second (192.168.1.111) is the development of the host IP; third (192.168.1.111) is the target board the gateway (GW) settings; fourth (255.255.255.0) is the subnet mask; fifth is the development of the host name (usually does not matter, can easily fill in)

eth0 is the LAN device name. Because the command is longer, easy to input errors, we have it written into the disc nfs.txt file, soYou can be copied directly, and as shown in Figure, Enter the start parameter will be automatically stored in the NAND.


[l] Download WinCE bootlogo
[w] Download WinCE NK.bin
[b] Boot the system
[s] Set the boot parameter of Linux
[i] Version: 1022
Enter your Selection:s
Linux cmd line: console=ttySAC0 root=/dev/nfs nfsroot=192.168.1.111:/opt/FriendlyARM/mini6410/root_qtopia_qt4 ip=192.168.1.70:192.168.1.111:192.168.1.111:255.255.255.0:sbc2440.arm9.net:eth0:off"
Linux command line saved
FriendlyARM Superboot(6410) for 6410
[f] Format the nand flash
[v] Download uboot.bin
[k] Download Linux/Android kernel
[y] Download root yaffs2 image
[u] Download root ubifs image
[a] Download Absolute User Application
[n] Download Nboot.nb0 for WinCE
[l] Download WinCE bootlogo
[w] Download WinCE NK.bin
[b] Boot the system
[s] Set the boot parameter of Linux
[i] Version: 1022
Enter your Selection:_

Then enter b, press enter to start over nfs system.


RPC: Registered udp transport module.
RPC: Registered tcp transport module.
s3c2410-rtc s3c2410-rtc: setting system clock to 2000-01-01 23:43:15 UTC (946770195)
eth0: link down
IP-Config: Complete:
device=eth0, addr=192.168.1.70, mask=255.255.255.0, gw=192.168.1.111,
host=sbc2440, domain=, nis-domain=arm9.net,
bootserver=192.168.1.111, rootserver=192.168.1.111, rootpath=
Looking up port of RPC 100003/2 on 192.168.1.111
eth0: link up, 100Mbps, full-duplex, lpa 0x45E1
Looking up port of RPC 100005/1 on 192.168.1.111
VFS: Mounted root (nfs filesystem).
Freeing init memory: 124K
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will be case sensitive!
[01/Jan/2000:15:43:29 +0000] boa: server version Boa/0.94.13
[01/Jan/2000:15:43:29 +0000] boa: server built Apr 8 2010 at 15:40:06.
[01/Jan/2000:15:43:29 +0000] boa: starting server pid=654, port 80
Try to bring eth0 interface up.....NFS root ...Done
Please press Enter to activate this console.
[root@FriendlyARM /]# _

1.3.5 the establishment of cross-compiler environment

The Linux platform, the development board for the kernel, graphical interface Qtopia/Qt4, bootloader, there are other applications that require cross-compiler tool chain, we use the arm-linux-gcc-4.5.1, it is the default using armv6

Instruction set, hardware floating point support, the following is the detailed steps to install it.

Step1: the CD-ROM Linux directory arm-linux-gcc-4.5.1-v6-vfp-20101103.tgz copy Fedora9

A directory such as tmp /, then go to the directory, perform decompression command:

Cd / tmp

Tar xvzf arm-linux-gcc-4.5.1-v6-vfp-20101103.tgz-C /

Note: C with a trailing space, and C is capitalized, it is the English word "Change" the first letter, in the meaning of this is to change the directory.

Execute the command, will arm-linux-gcc installed to / opt /toolschain/4.5.1 directory.

Step2: the compiler to add the path system environment variable, run the command

Gedit / root / .bashrc

Edit / root / .bashrc file, pay attention to "bashrc" in front of a ".", The last act to modify export PATH = $ PATH: / opt /toolschain/4.5.1/bin, attention paths must write, or else will not be effective.

Figure, save and exit.

Log system (without reboot the machine to start -> logout can be), so the above settings to take effect, at the command line

arm-linux-gcc-v, the following message will appear, indicating that cross-compiler environment has been successfully installed.

1.4 extracting installer source code and other tools

This section will extract the installation development process used to learn all the source code and some other small tools, including:

- Linux kernel source code

- Qtopia-2.2.0 source code platform (x86 and arm platform is divided into two versions)

- Arm-qt-extended-4.4.3 Platform source code (that is, Qtopia4, divided into two versions of x86 and arm)

- QtE-4.7.0 Platform source code (arm version)

- Busybox-1.17 source code

- Linux source code, programming examples

- U-boot source code

- The target file system directory

- The target file system image creation tools (including yaffs2 and UBIFS)

- GUI Linux logo creation tools logomaker

Note: All source code and tools are installed by way of extracting all the source code use the unified compiler arm-linux-gcc-4.4.1 compiler

The following is a detailed extract the installation process, and a brief introduction.

1.4.1 Extract the source code installation

First, create a working directory / opt /S3C6410-TFA/linuxAt the command line

 # Mkdir-p / opt /S3C6410-TFA/linux

All source code behind the step will extract the installation this directory:

(1) ready for the Linux source code package

In Fedora9 system / tmp directory, create a temporary directory / **tmp / linux**

 # Mkdir / tmp / linux Linux directory in the CD all the files are copied to / **tmp / linux** directoryDescription: This is to unify thefollowing steps, in fact, you can use a different directory, you can alsodirectly from theExtract the installation CD.

(2) Extract the installation of U-boot source code in the working directory /opt /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux
Tar xvzf / tmp / linux / u-boot-S3C6410-TFA-20101106.tar.gz

Will create the build u-boot-S3C6410-TFA directory, which contains a complete description of U-bootsourcecode: 20101106 Release Date our logo, to the actual date of the CD suffix shall prevail.

(3) Extract the Linux kernel source code installed in the working directory /opt /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux
Tar xvzf / tmp / linux / linux-2.6.36-20101115.tar.gz

Will create a generation linux-2.6.36 directory, which contains the complete kernel sourcecodeDescription: 20101115 Date of issue of our logo, to the actual date of the CD suffix shallprevail.

(4) Extract the target file system installation execute the following command:

Cd / opt /S3C6410-TFA/linux
Tar xvzf / tmp / linux / rootfs_qtopia_qt4-20101120.tgz

Directory will be created to generate rootfs_qtopia_qt4Description: 20101120 Date of issue of our logo,to the actual date of the CD suffix shall prevail.

(5) extract the embedded graphics system installed qtopia source code in the working directory /opt /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux
Tar xvzf / tmp / linux / x86-qtopia-20100420.tar.gz
Tar xvzf / tmp / linux / arm-qtopia-20101105.tar.gz

Will create x86-qtopia and arm-qtopia two directories, and includes all of the corresponding sourcecode.Description: x86-qtopia and arm-qtopia back there may be a date suffix, it is issued or updated on our logo, to the actual date of the CD suffix shall prevail.Source code package also includes an embedded browser konquor the source code.In addition this source code package compared to Qt's original version has been patched, and made many improvements, they are source code form, we will not repeat all, and self-interested more.

(6) Extract the installation of embedded graphics system qt-extended-4.4.3 source codeThe code.In

the working directory / opt /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux

Tar xvzf / tmp / linux / x86-qt-extended-4.4.3-20101003.tgz

Tar xvzf / tmp / linux / arm-qt-extended-4.4.3-20101105.tgz

Will create x86-qt-extended-4.4.3 and arm-qt-extended-4.4.3 two directories, and includes all ofthecorresponding sourceDescription: x86-qt-extended-4.4.3 and arm-qt-extended-4.4.3 after the date suffix may be, it isThe dateof issue or update their logo, to the actual date of the CD suffix shall prevail. In addition, to use this source code package compared to Qt's original versionhasbeen played upDing, and made some improvements, they are source code form, we will not repeatall, interested and self-comparison.

(7) extract the installation QtE-4.7.0 source code in the working directory /opt /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux

Tar xvzf / tmp/linux/x86-qte-4.6.1-20100516.tar.gz

Tar xvzf / tmp / linux / arm-qte-4.7.0-20101105.tar.gz

Will create x86-qte-4.6.1 and two arm-qte-4.7.0 directory, and contains all the correspondingsourcecode.Description: x86-qte and arm-qte archive dates back suffix may be, it is our issue or updatedate, the actual date of the CD suffix shall prevail.One x86-qte-4.6.1 is mainly created Creatordevelopment platform, slightly lower version will not affect development.

(8) Extract the source code installed busybox Busybox

is a lightweight tool for linux command set is usedin this version of busybox-1.13.3.Users can download the latest version from their official website(http://www.busybox.net).In the working directory / opt/ /S3C6410-TFA/linux perform:

Cd / opt /S3C6410-TFA/linux

Tar xvzf / tmp / linux / busybox-1.17.2-20101120.tgz

Busybox-1.17.2 directory will be created, containing the appropriate version of the full sourcecode.Note:, we made a default configuration file fa.config.

(9) Extract the installation of Linux sample program performs the following command:

Cd / opt /S3C6410-TFA/linux

Tar xvzf / tmp / linux / examples-S3C6410-TFA-20101110.tgz

Will create the examples directory, and include beginner linux programming code examples.Description: 20101110 Date of issue of our logo, to the actual date of the CD suffix shall prevail.The code examplesdirectory are a set self-development, and provide all the source code, they are a smallnumber of command-line program.

1.4.2 Extract to create the target file system

According to the connection touch screen configuration, for the convenience of users, we haveproduced two target file system archive:

● rootfs_qtopia_qt4-20101120.tgz

●rootfs_qtopia_qt4-s-20101120.tgz

Of which: with "-s" representation for a professional serial LCD touch-screen controller package, it is suitable for largeSize of the four-wire resistive touch screen, will achieve better results; without "-s" representation of the ARM itself is touch-screen controller, or first-line touch screen (the first run will automatically recognize).Execute the following command:

Cd / opt /S3C6410-TFA/linux

Tar xvzf / tmp / linux / rootfs_qtopia_qt4-20101120.tgz

Tar xvzf / tmp / linux / rootfs_qtopia_qt4-s-20101120.tgz

Will create rootfs_qtopia_qt4 and rootfs_qtopia_qt4-s two directories, the directory and file systemused by the target board is exactly the same content.Description: 20101120 Release Date our logo, to theactual date of the CD suffix shall prevail, the file system contains a front you see qtopia-2.2.0, Qtopia4and QtE-4.7.0 test software, busybox, there are commonly used command-line tools, andbefore, it has the following features:

- Automatic Identification start or local start NFS
- Automatic recognition of the connection of the output display module is connected with a touchscreen, to determine first whether to start using the correction.If not connected, it will automaticallyenter the system, using the mouse; otherwise it will be touch screen calibration.
- Automatic Identification ordinary or high-speed SD card (maximum support 32G) and USB flash drives
- Auto-detect USB mouse or touch screen
- Support for USB mouse and touch-screen co-existence (starting from the Linux-2.6.36 support)

1.4.3 Extract installation file system image tool

We should all write the target file system development board, in general, need to first create the target file system directory into a single image file or copy to programming, Linux kernel boot time, generally based on the command line parameters the system hung in different formats such as yaffs2, ubifs, ext2, nfs, etc.They are generally small command line program.

For 64M or 128M/256M/512M/1GB De S3C2440-FA/mcro2440, respectively, two sets of production tools: mkyaffs2image and mkyaffs2image-128M.Which is produced for mkyaffs2image 64M version of the file system image tool that follows the previous name; mkyaffs2image-128M is produced for128M/256M/512M/1GB version of the file system image tools, in order to facilitate the distinction, we named it this. For the 6410 system, we did not make 64M version, so you can follow the system used by the 2440mkyaffs2image-128MUBIFS is nearly two years, another popular memory for embedded system file system format, UBIFS official use of the tool is more complex, and are a lot of parameters and procedures, in order to facilitate use, we also designed a mkubimage

Another mkext3image, it used to be made into a single target file system EXT3-image file, so that you can in ordinary FAT32/FAT format SD card to install a Linux system using a variety of classes, only a single system

image file corresponding copied to the SD card can be, this is no longer required a very complex procedure.We put these little tools collectively referred to as mktools, following its installation steps: Run the following command:# Tar xvzf / tmp / linux / mktools.tar.gz-C /

Will be in / usr / sbin directory to create generation mkyaffs2image, mkyaffs2image-128M, mkubimage,mkext3image

Note: C is capitalized, C with a trailing space, C is to change the installation directory extract the meaning of
Note: If you previously installed S3C2440-FA use mkyaffs2image family of tools, they will be overwritten,

Do not worry, they function the same.

1.4.4 extracting installer LogoMaker

LogoMaker is a set developed a Linux Logo simple authoring tools, there are many online information on how to use the command-line tool to bmp, jpg, png format images converted to Linux Logo file, In this we have designed a graphical version, which is based Fedora9 development.Execute the following command:

Tar xvzf / tmp / linux / logomaker.tgz-C /

Note: C is capitalized, C with a trailing space, C is to change the installation directory extract the meaning of

Description: The implementation of the above command, LogoMaker will be installed to / usr / sbin directory, it has only one file, after installation at the command line enter the following interface logomaker may, in a later section we will introduce how to use it:

Friendly Linux Logo Maker
File Help
FriendlyARM
BE DIFFERENT

1.5 Configure and compile U-boot

Samsung has been good for the 6410 transplant U-boot, and support for USB download, Nand start, etc., it is open source, nothing more.On this basis, we are on the U-boot to do a lot of improvements:

- Increase the download menu, similar to the USB download menu Superboot
- Increase the SD card boot configuration
- Support for direct download programming yaffs2 file system image
- Support for programming WindowsCE BootLoader of Nboot
- Support for image feature programming WindowsCE
- Support for burning single file image files, the program is commonly referred to as bare metal
- Support for return to the original shell
- Added support for 256M DDR RAM Here we describe the configuration and compile it and use it.

1.5.1 Configuring the Compile NAND boot support for the U-boot

Description: According to the different development board memory (DDR RAM) capacity, need to use a different U-boot configuration items. To compile for 128M memory, U-boot, follow these steps:

U-boot code into the source directory, run:

Cd / opt /S3C6410-TFA/linux/u-boot-S3C6410-TFA

Make S3C6410-TFA_nand_config-ram128; make

Configuration and in the current directory will be compiled to support Nand start U-boot.bin, use the SD card or USB download to Nand Flash can be used, see "Brush Guide" CD-ROM images / linux directory has been provided compiled the file, for ease of distinction, we rename it to u-boot_nand-ram128.bin

To compile for 256M memory U-boot, follow these steps: Go to U-boot source directory, run:

Cd / opt /S3C6410-TFA/linux/u-boot-S3C6410-TFA

Make S3C6410-TFA_nand_config-ram256; make

Configuration and in the current directory will be compiled to support Nand start U-boot.bin, use the SD card or USB download to Nand Flash can be used, see "Brush Guide" CD-ROM images / linux directory has been provided compiled the file, for ease of distinction, we rename it to u-boot_nand-ram256.bin

1.5.2 SD card support for configuring compile U-boot boot

Description: According to the different development board memory (DDR RAM) capacity, need to use a different U-boot configuration items. To compile for 128M memory, U-boot, follow these steps:

U-boot code into the source directory, run:

Cd / opt /S3C6410-TFA/linux/u-boot-S3C6410-TFA

Make S3C6410-TFA_sd_config-ram128; make

In the current directory will be compiled with support for SD configuration and start U-boot.bin, using SD-Flasher.exe tool it programmed into the SD card, set development board from the start to use the SD card, you can refer to 2.2 sections of the steps, simply one of the Superboot.bin to U-boot.bin on it.CD images / linux directory has been compiled in the document provided, in order to facilitate the distinction, we rename it to u-boot_sd-ram128.bin

To compile for 256M memory U-boot, follow these steps: Go to U-boot source directory, run:

Cd / opt /S3C6410-TFA/linux/u-boot-S3C6410-TFA

Make S3C6410-TFA_sd_config-ram256; make

In the current directory will be compiled with support for SD configuration and start the U-boot.bin, using the SD-Flasher.exe tool programmed it to an SD card, set the development board can be used starting from the SD card, you can refer to 2.2 sections of the steps, simply one of the Superboot.bin to U-boot.bin on it.CD images / linux directory has been compiled in the document provided, in order to facilitate the distinction, we rename it to u-boot_sd-ram256.bin

1.5.3 U-boot instructions

Unfinished

1.6 Configure and compile the kernel (Kernel)

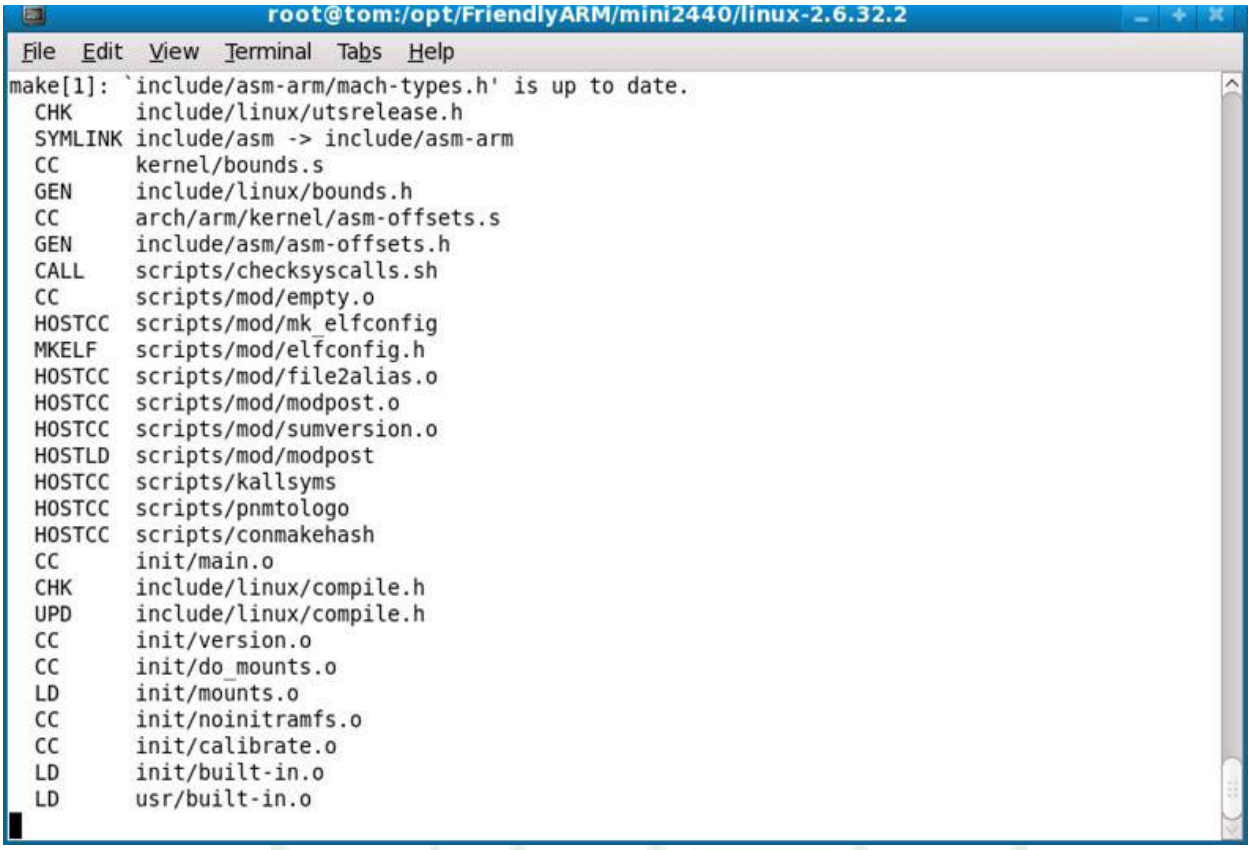
In order to facilitate the user to compile a file and CD burning is fully consistent core, we focused on different LCD output separately the corresponding kernel configuration file:

config_S3C6410-TFA_x35 - for Sony 3.5 "LCD, a resolution of 240x320 config_S3C6410-TFA_n43 - for NEC4.3" LCD, a resolution of 480x272 config_S3C6410-TFA_l80 - for Sharp 8 "(or compatible) LCD, a resolution of 640x480 config_S3C6410-TFA_a70 - for 7-inch true color screen, a resolution of 800x480 config_S3C6410-TFA_vga1024x768 - for resolution of 1024x768 VGA output module adapter plate config_S3C6410-TFA_vga800x600 - for the VGA resolution of 800x600 output module adapter plate config_S3C6410-TFA_vga640x480 - for the VGA resolution of 640x480 output module adapter plate config_S3C6410-TFA_ezvga800x600 - VGA adapter plate for easy output resolution of 800x600

Default the following command to compile the kernel configuration file config_n43

Cp config_S3C6410-TFA_n43. Config; Note: n43 with a trailing space, then there is a "."Beginning of the config

Make zImage; start compiling the kernel, you can directly use the make command



After compilation, in arch / arm / boot directory to generate the linux kernel image file zImage, you can use the third section describes the method to download the zImage to the development board testing.

CD images / linux directory has been compiled to provide a good core file, depending on the type of LCD models, respectively: zImage_n43, zImage_a70 etc.

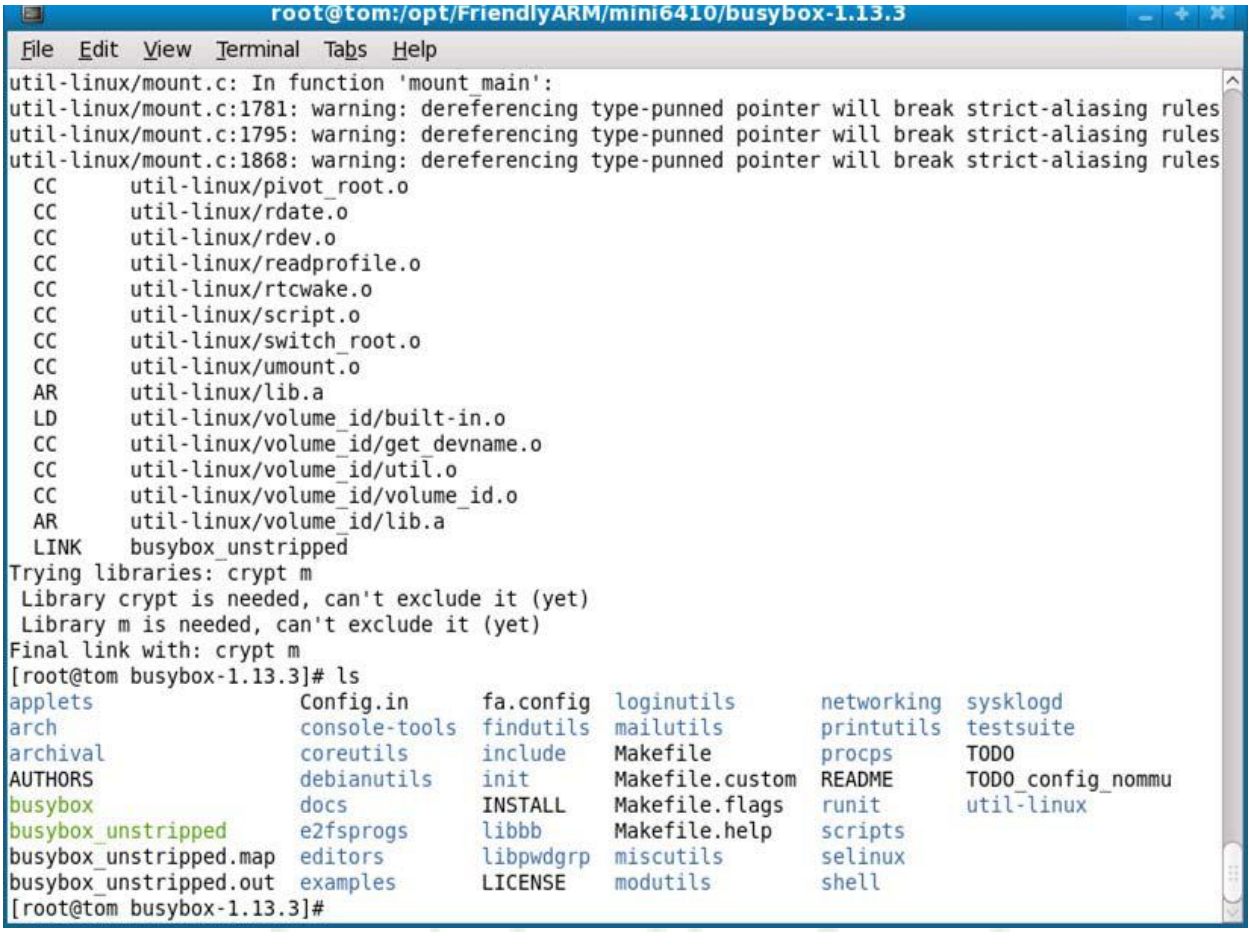
1.7 Configure and compile busybox

Usually downloaded from the official website busybox source code needed to reconfigure the need to look at, it can be compiled to use, we have to do a default configuration file: fa.config, both the 2440 and 6410 we have used this configuration through which compiles busybox to meet most needs, into the busybox source directory, run:

Cp fa.config. Config

Make

Wait a minute, can be compiled busybox in the current directory target file, it is the same as pre-development board, generally busybox is not updated.


root@tom:/opt/FriendlyARM/mini6410/busybox-1.13.3
File Edit View Terminal Tabs Help
util-linux/mount.c: In function 'mount_main':
util-linux/mount.c:1781: warning: dereferencing type-punned pointer will break strict-aliasing rules
util-linux/mount.c:1795: warning: dereferencing type-punned pointer will break strict-aliasing rules
util-linux/mount.c:1868: warning: dereferencing type-punned pointer will break strict-aliasing rules
CC util-linux/pivot_root.o
CC util-linux/rdate.o
CC util-linux/rdev.o
CC util-linux/readprofile.o
CC util-linux/rtcwake.o
CC util-linux/script.o
CC util-linux/switch_root.o
CC util-linux/umount.o
AR util-linux/lib.a
LD util-linux/volume_id/built-in.o
CC util-linux/volume_id/get_devname.o
CC util-linux/volume_id/util.o
CC util-linux/volume_id/volume_id.o
AR util-linux/volume_id/lib.a
LINK busybox_unstripped
Trying libraries: crypt m
Library crypt is needed, can't exclude it (yet)
Library m is needed, can't exclude it (yet)
Final link with: crypt m
[root@tom busybox-1.13.3]# ls
applets Config.in fa.config loginutils networking sysklogd
arch console-tools findutils mailutils printutils testsuite
archival coreutils include Makefile procps TODO
AUTHORS debianutils init Makefile.custom README TODO_config_nommu
busybox docs INSTALL Makefile.flags runit util-linux
busybox_unstripped e2fsprogs libbb Makefile.help scripts
busybox_unstripped.map editors libpwdgrp miscutils selinux
busybox_unstripped.out examples LICENSE modutils shell
[root@tom busybox-1.13.3]#

1.8 Production target file system image

Make sure you have followed the steps in section 4.4.4 installed mktools series of tools, they are the same target will suppress the file system directory to a different image file formats to be programmed into the Nand Flash used to install or copy to SD card in operation.

Also make sure you are ready to 4.4.2 of the preparatory work is to prepare the target file system directory.

1.8.1 Production yaffs2 file system image

Into the working directory / opt /S3C6410-TFA/linux, execute the following command:

Mkyaffs2image-128M rootfs_qtopia_qt4 rootfs_qtopia_qt4.img

Repression of the directory will rootfs_qtopia_qt4 rootfs_qtopia_qt4.img yaffs2 image file format, it CD / images / Linux / directory under the same name is the same, using the SD card or USB download, it can be programmed into the Nand Flash, the burning Write the steps described in "Brush Guide."

Note: You can use this tool to rootfs_qtopia_qt4-s command to suppress the yaffs2 image file directory, will not go.

1.8.2 Production ubifs file system image

Into the working directory / opt /S3C6410-TFA/linux, execute the following command:

Mkyaffs2image-128M rootfs_qtopia_qt4 rootfs_qtopia_qt4.ubi

Repression of the directory will rootfs_qtopia_qt4 rootfs_qtopia_qt4.ubi UBIFS image file format, it CD / images / Linux / directory under the same name is the same, using the SD card or USB download, it can be programmed into the Nand Flash, the burning Write the steps described in "Brush Guide."

Note: You can use this tool to rootfs_qtopia_qt4-s command to suppress the ubifs image file directory, will not go

1.8.3 create ext3 file system image

Into the working directory / opt /S3C6410-TFA/linux, execute the following command:

Mkext3image-128M rootfs_qtopia_qt4 rootfs_qtopia_qt4.ext3

Suppressed as EXT3 will rootfs_qtopia_qt4 catalog image file format rootfs_qtopia_qt4.ext3 it and CD / images / Linux / directory under the same name is the same, the instructions refer to section 3.3, copy it into the SD card you can use it running system.

Note: You can use this tool to rootfs_qtopia_qt4-s command to suppress the ext3 image file directory, will not go

1.9 Examples of embedded Linux applications

This section embedded Linux development through the most simple example, how to write and compile Linux applications, and download to development board up and running.

If you have already performed the steps in section 4.4.1, you can / opt /S3C6410-TFA/examples

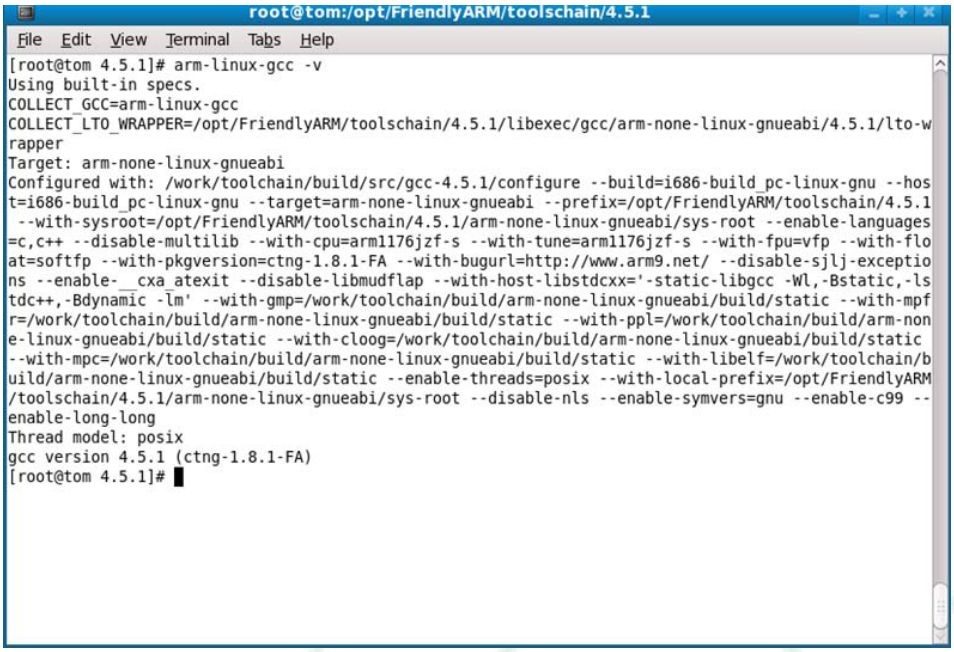
Directory to find the following sample source code, the actual number may be more, just choose a few examples of the following for guidance.

Embedded Linux is rich in resources, we can not introduce into every detail, this paper aims to provide some of the embedded

Linux often used method for you to open the door to a wonderful world.

Note: The following example program uses the compiler to arm-linux-gcc-4.5.1-v6-vfp, if you use other versions of the cross-compiler, there may not be compiled to run on the development board.

To check the cross-compiler version of the type, can be run in a terminal command: arm-linux-gcc-v, as shown in Figure


root@tom:/opt/FriendlyARM/toolschain/4.5.1
File Edit View Terminal Tabs Help
[root@tom 4.5.1]# arm-linux-gcc -v
Using built-in specs.
COLLECT_GCC=arm-linux-gcc
COLLECT_LTO_WRAPPER=/opt/FriendlyARM/toolschain/4.5.1/libexec/gcc/arm-none-linux-gnueabi/4.5.1/lto-wrapper
Target: arm-none-linux-gnueabi
Configured with: /work/toolchain/build/src/gcc-4.5.1/configure --build=i686-build_pc-linux-gnu --host=i686-build_pc-linux-gnu --target=arm-none-linux-gnueabi --prefix=/opt/FriendlyARM/toolschain/4.5.1 --with-sysroot=/opt/FriendlyARM/toolschain/4.5.1/arm-none-linux-gnueabi/sys-root --enable-languages=c,c++ --disable-multilib --with-cpu=arm1176jzf-s --with-tune=arm1176jzf-s --with-fpu=vfp --with-float=softfp --with-pkgversion=ctng-1.8.1-FA --with-bugurl=http://www.arm9.net/ --disable-sjlj-exceptions --enable-__cxa_atexit --disable-libmudflap --with-host-libstdcxx='-static-libgcc -Wl,-Bstatic,-lstdc++,-Bdynamic -lm' --with-gmp=/work/toolchain/build/arm-none-linux-gnueabi/build/static --with-mpfr=/work/toolchain/build/arm-none-linux-gnueabi/build/static --with-ppl=/work/toolchain/build/arm-none-linux-gnueabi/build/static --with-cloog=/work/toolchain/build/arm-none-linux-gnueabi/build/static --with-mpc=/work/toolchain/build/arm-none-linux-gnueabi/build/static --with-libelf=/work/toolchain/build/arm-none-linux-gnueabi/build/static --enable-threads=posix --with-local-prefix=/opt/FriendlyARM/toolschain/4.5.1/arm-none-linux-gnueabi/sys-root --disable-nls --enable-symvers=gnu --enable-c99 --enable-long-long
Thread model: posix
gcc version 4.5.1 (ctng-1.8.1-FA)
[root@tom 4.5.1]#

Disclaimer: we found that some companies or individuals to modify development board a copyright note, for themselves, although the domestic base for such copying is not legally binding, but we have such a shameless theft to be despised, and advising everyone to respect the original manufacturers of hard labor.

1.9.1 Hello, World!

Hello, World source code is located in the / opt /S3C6410-TFA/linux/examples/hello directory, its source code is as follows:

```
# Include <stdio.h>
int main (void) {
printf ("hello,!n.
}
```

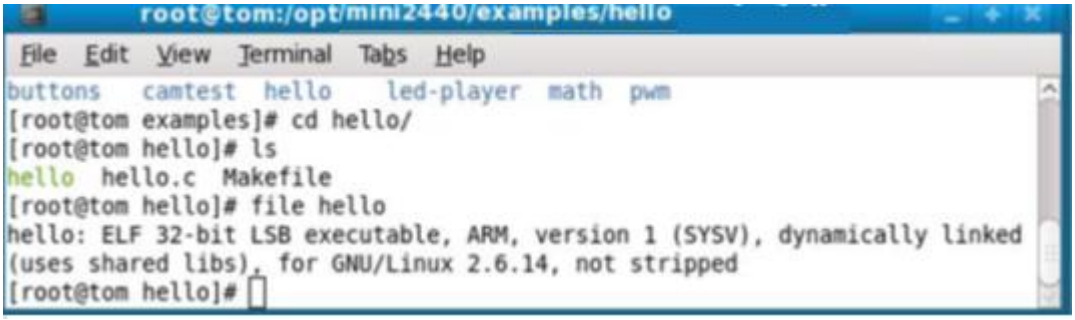
Step1: compile the Hello, World

Into the source directory, and run make:

Cd / opt /S3C6410-TFA/linux/examples/hello

Make

Finally, the generated executable file hello, you use the file command to check whether the resulting executable file hello And format for the ARM architecture version, the development board in the normal operation of the executable file is generally as shown:


root@tom:/opt/mini2440/examples/hello
File Edit View Terminal Tabs Help
buttons camtest hello led-player math pwm
[root@tom examples]# cd hello/
[root@tom hello]# ls
hello hello.c Makefile
[root@tom hello]# file hello
hello: ELF 32-bit LSB executable, ARM, version 1 (SYSV), dynamically linked
(uses shared libs), for GNU/Linux 2.6.14, not stripped
[root@tom hello]#

Step2: the Hello, World download to development board running

Download the executable file will be compiled to the target board is mainly in four ways: first: to transfer files via ftp to the development board (recommended) second: Copy to media (eg USB) third: via the serial port transfer files to the development board

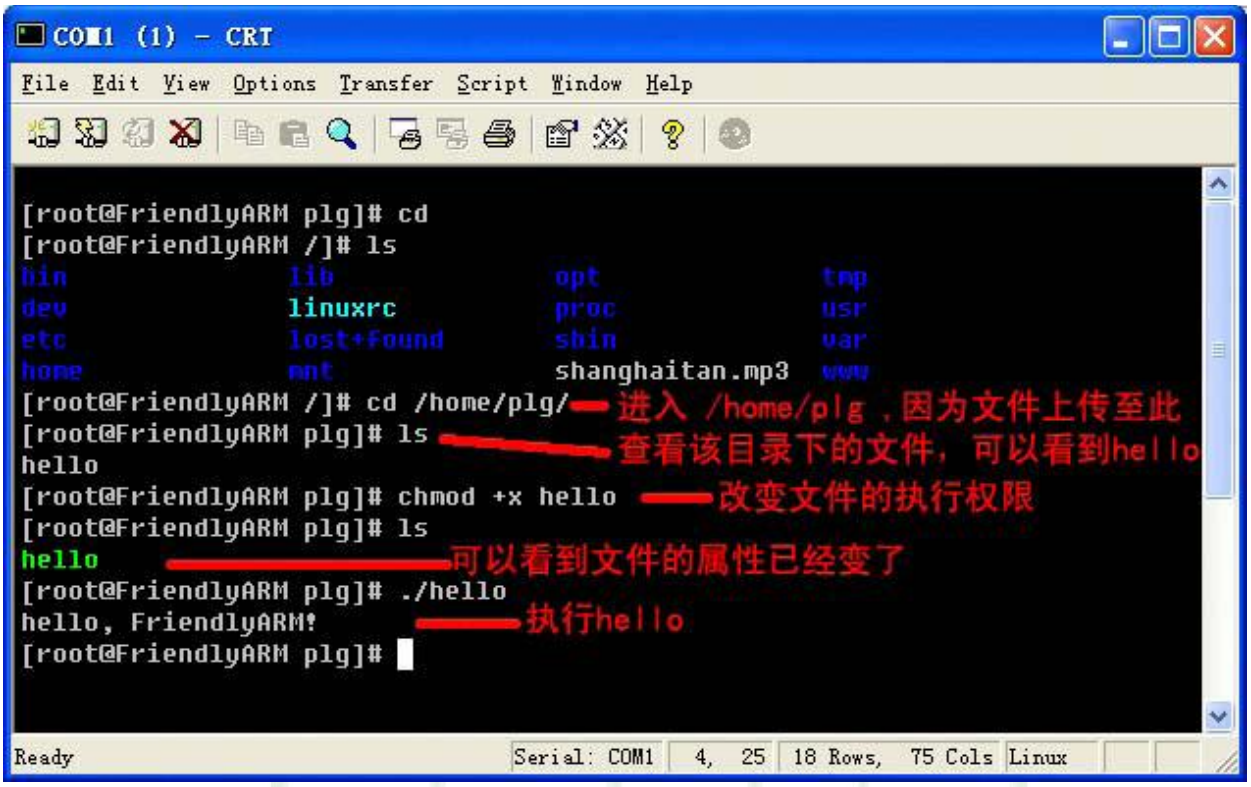
Fourth: The NFS (Network File System) were introduced directly run the following:

(1) use ftp to transfer files (recommended)

Note: the target board using ftp login, upload the compiled program; and then upload the target board to modify the program executable, and run.

First, the PC-side implementation, as shown

Then, one end of the implementation of the target board, as shown



(2) the use of USB flash drives

Description: first copy the compiled executable to USB flash drives, USB flash drives plug into the target board and then mount it, then copied to the target program executable directory / bin

Steps:

a. Copy the program to the USB

The flash drive plugged into the PC's USB port, execute the following command to copy the program to flash drive

Mount / dev/sda1 / mnt; mount USB

Cp hello / mnt; copy just the compiled program to the USB

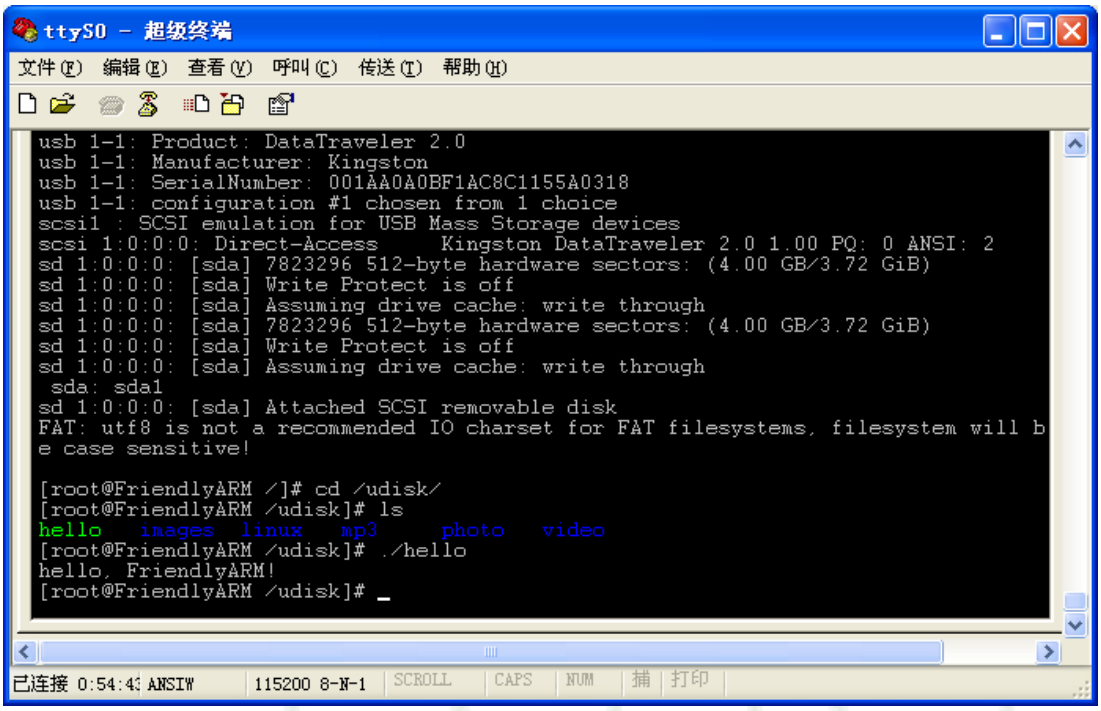
Umount / mnt; uninstall USB

2. Copy the program from the flash drive to the target board and run

Inserted into the USB development board's USB Host interface, USB will be automatically mounted to / udisk directory, execute the following command to run the hello program.

Cd / udisk

#. / Hello; execute hello program Note: If you unplug the USB mandatory at this time, you need to return to the root directory, then run umount / udisk be for the next A good auto-mount preparations.


ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
usb 1-1: Product: DataTraveler 2.0
usb 1-1: Manufacturer: Kingston
usb 1-1: SerialNumber: 001AA0A0BF1AC8C1155A0318
usb 1-1: configuration #1 chosen from 1 choice
scsi1 : SCSI emulation for USB Mass Storage devices
scsi 1:0:0:0: Direct-Access Kingston DataTraveler 2.0 1.00 PQ: 0 ANSI: 2
sd 1:0:0:0: [sda] 7823296 512-byte hardware sectors: (4.00 GB/3.72 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] 7823296 512-byte hardware sectors: (4.00 GB/3.72 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Assuming drive cache: write through
sda: sda1
sd 1:0:0:0: [sda] Attached SCSI removable disk
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will b
e case sensitive!
[root@FriendlyARM /]# cd /udisk/
[root@FriendlyARM /udisk]# ls
hello images linux mp3 photo video
[root@FriendlyARM /udisk]# ./hello
hello, FriendlyARM!
[root@FriendlyARM /udisk]#
已连接 0:54:43 ANSIW
115200 8-N-1
SCROLL
CAPS
NUM
捕
打印

(3) through the serial port to transfer files to the development board
By chapter 4.2.5 we learned how to transfer files via the serial port to the development board, you can also send the same method hello executable, no concrete steps in this detailed description, remember to transfer property to completion of the file executable to normal operation.
Chmod + x hello
Note: Some users use a USB to serial cable, because some adapter performance is not too good, so sometimes "transfer out" or simply can not be transferred to the development board and, therefore, we recommend the use of ftp transfer to the development board .
(4) through the implementation of Network File System (NFS)
Linux is the most commonly used method is to use NFS to perform a variety of programs, so you can not spend a lot of time to download the program, although this does not take long to download the hello program, once your application has become more and more, you will find where the convenience of using NFS to run.
As previously described, as, first set up in accordance with 4.3.4 a good NFS server system, then enter the following command at the command line (assuming the server's IP address is 192.168.1.111):
Mount-t nfs-o nolock
192.168.1.111: / opt /S3C6410-TFA/linux/rootfs_qtopia_qt4 / mnt
Mount successfully, you can access the / mnt directory to operate on your PC Linux terminal to copy hello opt /S3C6410-TFA/linux/rootfs_qtopia_qt4 directory, then the serial port terminal in the development of executive board
Cd / mnt
#. / Hello

1.9.2 LED test procedure

Program source code instructions	
Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char
Driver Name	S3C6410-TFA_leds.c
Device type	misc
Device name	/ dev / leds
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/leds

Test program name	led.c
Test program executable file name	Led
Testing procedures in place in the development board	
Description: LED driver has been compiled into the default kernel, so can not be loaded using insmod.	

Listing

```
# Include <stdio.h>

# Include <stdlib.h>

# Include <unistd.h>

# Include <sys/ioctl.h>

int main (int argc, char ** argv)

{

int on;

int led_no;

int fd;

/ * Check the led two control parameters, if no parameter input is withdraw.* /

if (argc!= 3 | | sscanf (argv [1], "% d", & led_no)!= 1 | | sscanf (argv [2], "% d", & on)!1

on <0 | | on> 1 | | led_no <0 | | led_no> 3) {fprintf (stderr, "Usage: leds led_no 0 | 1 \ n"); exit (1);

}

/ * Open / dev / leds device file * /

fd = open ("/ dev/leds0", 0);

if (fd <0) {

fd = open ("/ dev / leds", 0);

}

if (fd <0) {

perror ("open device leds");

exit (1);

}

/ * And enter through the ioctl system call parameter control led * /

ioctl (fd, on, led_no);

/ * Close the device handle * /

close (fd);
```

```
return 0;

}
```

You can follow the above steps to compile the hello program led executable file, then downloaded to the development board to run it.

1.9.3 Test button

Program source code instructions	
Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char
Driver Name	S3C6410-TFA_buttons.c
Device type	misc
Device name	/ dev / buttons
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/buttons
Test program source code name	buttons_test.c
Test program executable file name of the	buttons
Test program development board in the position	
description: Key drivers have been compiled into the default kernel, so can not be loaded using insmod.	

Listing

```
# Include <stdio.h>
# Include <stdlib.h>
# Include <unistd.h>
# Include <sys/ioctl.h>
# Include <sys/types.h>
# Include <sys/stat.h>
# Include <fcntl.h>
# Include <sys/select.h>
# Include <sys/time.h>
# Include <errno.h>
int main (void)
{
int buttons_fd;
char buttons [6] = {'0 ', '0', '0 ', '0', '0 ', '0'};
buttons_fd = open ("/ dev / buttons", 0);
if (buttons_fd <0) {
perror ("open device buttons");
exit (1);
}
for (;;) {
```

```
char current_buttons [6];
int count_of_changed_key;
int i;
if (read (buttons_fd, current_buttons, sizeof current_buttons)!= Sizeof current_buttons) {
perror ("read buttons:");
exit (1);
}
for (i = 0, count_of_changed_key = 0; i <sizeof buttons / sizeof buttons [0]; i + +) {
if (buttons [i]!= Current_buttons [i]) {
buttons [i] = current_buttons [i];
printf ("% skey% d is% s", count_of_changed_key? ",": "", I +1, buttons [i] ==
Thus answer is 18.;0 "Up": "down");
count_of_changed_key + +;
}
}
if (count_of_changed_key) {
printf ("\ n");
}
}
close (buttons_fd);
return 0;
}
```

Hello you can follow the procedures above compiling hand out buttons executable file, then downloaded to the development board Run it

1.9.4 PWM control buzzer programming examples

Program source code instructions	
Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char
Driver Name	S3C6410-TFA_pwm.c
Device type	misc
Device name	/ dev / pwm
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/pwm
Test program source code name	pwm_test.c
Test program executable file name	Pwm_test
Testing procedures in place in the development board	
Description: PWM control buzzer driver has been compiled into the default kernel, so can not be loaded using the insmod program list	

Listing

```
# Include <stdio.h>
# Include <termios.h>
# Include <unistd.h>
# Include <stdlib.h>
# Define PWM_IOCTL_SET_FREQ 1
# Define PWM_IOCTL_STOP 2
# Define ESC_KEY 0x1b

static int getch (void)
{
struct termios oldt, newt;
int ch;
if (!isatty (STDIN_FILENO)) {
fprintf (stderr, "this problem should be run at a terminal \ n");
exit (1);
}
/ / Save terminal setting if (tcgetattr (STDIN_FILENO, & oldt) <0) {
perror ("save the terminal setting");
exit (1);
}
/ / Set terminal as need newt = oldt;
newt.c_lflag & = ~ (ICANON | ECHO);
if (tcsetattr (STDIN_FILENO, TCSANOW, & newt) <0) {
perror ("set terminal");
exit (1);
}
ch = getchar ();
/ / Restore termial setting if (tcsetattr (STDIN_FILENO, TCSANOW, & oldt) <0) {
perror ("restore the termial setting");
exit (1);
}
```

```
return ch;
}
static int fd = -1;

static void close_buzzer (void);

static void open_buzzer (void)
{
fd = open ("/ dev / pwm", 0);
if (fd <0) {
perror ("open pwm_buzzer device");
exit (1);
}
/ / Any function exit call will stop the buzzer atexit (close_buzzer);
}

static void close_buzzer (void)
{
if (fd> = 0) {
ioctl (fd, PWM_IOCTL_STOP);
close (fd);
fd = -1;
}
}

static void set_buzzer_freq (int freq)
{
/ / This IOCTL command is the key to set frequency int ret = ioctl (fd, PWM_IOCTL_SET_FREQ, freq); if (ret <0) {
perror ("set the frequency of the buzzer");
exit (1);
}

}
```

```
static void stop_buzzer (void)
{
int ret = ioctl (fd, PWM_IOCTL_STOP);
if (ret <0) {
perror ("stop the buzzer");
exit (1);
}
}
int main (int argc, char ** argv)
{
int freq = 1000;
open_buzzer ();
printf ("\ nBUZZER TEST (PWM Control) \ n");
printf ("Press + / - to increase / reduce the frequency of the BUZZER \ n");
printf ("Press 'ESC' key to Exit this program \ n \ n");

while (1)
{
int key;
set_buzzer_freq (freq);
printf ("\ tFreq =% d \ n", freq);
key = getch ();
switch (key) {
case '+':
if (freq <20000)
freq + = 10;
break;
case '-':
if (freq> 11)
freq -= 10;
break;
case ESC_KEY:
```

```
case EOF: stop_buzzer (); exit (0);
default:
break;
}
}
}
```

Hello you can follow the procedures above compiling hand out buttons executable file, then downloaded to the development board Run it

1.9.5 I2C-EEPROM programming examples

Program source code instructions	
Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/i2c/busses
Driver Name	I2c-s3c2410.c
device type	character device
device name	/ dev/i2c/0
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/i2c
Test program source code name	eeprog.c 24cXX.c
test program executable file name	I2c
Testing procedures in place in the development board	
Description: I2C driver has been compiled into the default kernel, so can not be loaded using insmod.	

Listing

Note: The following procedures need to program with the support directory 24cXX.c

```
# Include <stdio.h>
# Include <fcntl.h>
# Include <getopt.h>
# Include <unistd.h>
# Include <stdlib.h>
# Include <errno.h>
# Include <string.h>
# Include <sys/types.h>
# Include <sys/stat.h>
# Include "24cXX.h"

# Define usage_if (a) do {do_usage_if (a, LINE__);} while (0);
void do_usage_if (int b, int line)
{
const static char * eeprog_usage =
"I2C-24C08 (256 bytes) Read / Write Program, ONLY FOR TEST!\ N \ n ";
if (!{0}B.{/0} {1} {/1}{2} {/2}
Retur
fprintf (stderr, "% s \ n [line% d] \ n", eeprog_usage, line);
exit (1);
```

```
}



# Define die_if (a, msg) do {do_die_if (a, msg, LINE);} while (0);
void do_die_if (int b, char * msg, int line)
{
if (!{0}B.{/0} {1} {/1}{2} {/2}
Retur
fprintf (stderr, "Error at line% d:% s \ n", line, msg); fprintf (stderr, "sysmsg:% s \ n", strerror (errno)); exit (1);
}



static int read_from_eeprom (struct eeprom * e, int addr, int size)
{
int ch, i;
for (i = 0; i <size; + + i, + + addr)
{
die_if ((ch = eeprom_read_byte (e, addr)) <0, "read error");
if ((i% 16) == 0)
printf ("\ n% .4 x |", addr);
else if ((i% 8) == 0)
printf (""); printf ("% .2 x", ch); fflush (stdout);
}
fprintf (stderr, "\ n \ n");
return 0;
}



static int write_to_eeprom (struct eeprom * e, int addr)
{
int i;
for (i = 0, addr = 0; i <256; i + +, addr + +)
{
if ((i% 16) == 0)
printf ("\ n% .4 x |", addr);
else if ((i% 8) == 0)
printf (""); printf ("% .2 x", i); fflush (stdout);
die_if (eeprom_write_byte (e, addr, i), "write error");
}
fprintf (stderr, "\ n \ n");
```

```
return 0;
}


int main (int argc, char ** argv)
{
struct eeprom e;
int op;


op = 0;


usage_if (argc!= 2 | | argv [1] [0]!= '-' | | Argv [1] [2]!Thus answer is 18.;0
op = argv [1] [1];


fprintf (stderr, "Open / dev/i2c/0 with 8bit mode \ n");
die_if (eeprom_open ("/ dev/i2c/0", 0x50, EEPROM_TYPE_8BIT_ADDR, & e) <0, "unable to open eeprom device
file"
"(Check that the file exists and that it's readable)");
switch (op)
{
case 'r':
fprintf (stderr, "Reading 256 bytes from 0x0 \ n");
read_from_eeprom (& e, 0, 256);
break;
case 'w':
fprintf (stderr, "Writing 0x00-0xff into 24C08 \ n");

write_to_eeprom (& e, 0);
break;
default: usage_if (1); exit (1);
}
eeprom_close (& e);


return 0;
}
```

1.9.6 serial programming examples

Program source code instructions

Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/serial /
Driver Name	S3c6400.c
Device name	/ dev/ttySAC0, 1,2,4
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/comtest
Test program source code name	comtest.c
Test program executable file name	armcomtest
Testing procedures in place in the development board	
Description: The test program compiled version available x86 version and arm, and its source code is exactly the same	

Listing

Description: comtest program is a development of a serial test program, it is actually a very simple serial terminal program, similar to linux in minicom, the program has nothing to do with the hardware, so the same code applies not only to any Arm- linux development board platform can also be used to run on the PC linux, methods are exactly the same.Through this program you can learn some of the common serial key programming set, useful for the serial programming under linux and learn the procedure, although very short, but clever design with great seriousness, we have not explained in detail, following it The complete source code:

Note: This program is belongs to all, any units or individuals are required to indicate the source reproduced or copied, and not for commercial use.

```
# Include <stdio.h>

# Include <stdlib.h>

# Include <termio.h>

# Include <unistd.h>

# Include <fcntl.h>

# Include <getopt.h>

# Include <time.h>

# Include <errno.h>

# Include <string.h>


static void Error (const char * Msg)

{

fprintf (stderr, "% s \ n", Msg);

fprintf (stderr, "strerror () is% s \ n", strerror (errno));

exit (1);
```

```
}

static void Warning (const char * Msg)

{

fprintf (stderr, "Warning:% s \ n", Msg);

}


static int SerialSpeed (const char * SpeedString)

{

int SpeedNumber = atoi (SpeedString);

# Define TestSpeed (Speed) if (SpeedNumber == Speed) return B # # Speed

TestSpeed (1200); TestSpeed (2400); TestSpeed (4800); TestSpeed (9600); TestSpeed (19200); TestSpeed (38400);
TestSpeed (57600); TestSpeed (115200); TestSpeed (230400); Error ("Bad speed "); return -1;

}


static void PrintUsage (void)

{


fprintf (stderr, "comtest - interactive program of comm port \ n");

fprintf (stderr, "press [ESC] 3 times to quit \ n \ n");

fprintf (stderr, "Usage: comtest [-d device] [-t tty] [-s speed] [-7] [-c] [-x] [-o] [-h] \ n");

fprintf (stderr, "-7 7 bit \ n");

fprintf (stderr, "-x hex mode \ n"); fprintf (stderr, "-o output to stdout too \ n"); fprintf (stderr, "-c stdout output use
color \ n"); fprintf (stderr, "-h print this help \ n");

exit (-1);

}

static inline void WaitFdWriteable (int Fd)

{

fd_set WriteSetFD; FD_ZERO (& WriteSetFD); FD_SET (Fd, & WriteSetFD);

if (select (Fd + 1, NULL, & WriteSetFD, NULL, NULL) <0) {

Error (strerror (errno));
```

```
}
}

int main (int argc, char ** argv)
{
int CommFd, TtyFd;

struct termios TtyAttr;
struct termios BackupTtyAttr;
int DeviceSpeed = B115200;
int TtySpeed = B115200;
int ByteBits = CS8;
const char * DeviceName = "/ dev/ttyS0";
const char * TtyName = "/ dev / tty";
int OutputHex = 0;
int OutputToStdout = 0;
int UseColor = 0;
opterr = 0;
for (;;) {
int c = getopt (argc, argv, "d: s: t: 7xoch");
if (c == -1) break; switch (c) {
case 'd':
DeviceName = optarg;
break;
case 't':
TtyName = optarg;
break;
case 's':
if (optarg [0] == 'd') {
```

```
DeviceSpeed = SerialSpeed (optarg + 1);
} Else if (optarg [0] == 't') {
TtySpeed = SerialSpeed (optarg + 1);
} Else
case 'o':
TtySpeed = DeviceSpeed = SerialSpeed (optarg);
break;
OutputToStdout = 1;
break;
case '7 ':
ByteBits = CS7;
break;
case 'x':
OutputHex = 1;
break;
case 'c':
UseColor = 1;
break; case '?': case 'h': default:
PrintUsage ();
}
}
if (optind!= Argc) PrintUsage ();
CommFd = open (DeviceName, O_RDWR, 0);
if (CommFd <0)
Error ("Unable to open device");
if (fcntl (CommFd, F_SETFL, O_NONBLOCK) <0) Error ("Unable set to NONBLOCK mode");
memset (& TtyAttr, 0, sizeof (struct termios)); TtyAttr.c_iflag = IGNPAR;
TtyAttr.c_cflag = DeviceSpeed | HUPCL | ByteBits | CREAD | CLOCAL;
TtyAttr.c_cc [VMIN] = 1;
```

```
if (tcsetattr (CommFd, TCSANOW, & TtyAttr) <0) Warning ("Unable to set comm port");

TtyFd = open (TtyName, O_RDWR | O_NDELAY, 0);

if (TtyFd <0) Error ("Unable to open tty");

TtyAttr.c_cflag = TtySpeed | HUPCL | ByteBits | CREAD | CLOCAL;

if (tcgetattr (TtyFd, & BackupTtyAttr) <0) Error ("Unable to get tty");

if (tcsetattr (TtyFd, TCSANOW, & TtyAttr) <0) Error ("Unable to set tty");

for (;;) {

unsigned char Char = 0;

fd_set ReadSetFD;

void OutputStdChar (FILE * File) {

char Buffer [10];

int Len = sprintf (Buffer, OutputHex? "% .2 X": "% c", Char);

fwrite (Buffer, 1, Len, File);

}

FD_ZERO (& ReadSetFD);

FD_SET (CommFd, & ReadSetFD); FD_SET (TtyFd, & ReadSetFD);

# Define max (x, y) (((x)> = (y))? (X): (y))

if (select (max (CommFd, TtyFd) + 1, & ReadSetFD, NULL, NULL, NULL) <0) {Error (strerror (errno));

}

# Undef max


if (FD_ISSET (CommFd, & ReadSetFD)) {

while (read (CommFd, & Char, 1) == 1) {

WaitFdWriteable (TtyFd);

if (write (TtyFd, & Char, 1) <0) {Error (strerror (errno));

}

if (OutputToStdout) {

if (UseColor) fwrite ("\ x1b [01; 34m", 1, 8, stdout); OutputStdChar (stdout);

if (UseColor)
```

```
fwrite ("\ x1b [00m", 1, 8, stdout);
fflush (stdout);
}
}
}
if (FD_ISSET (TtyFd, & ReadSetFD)) {
while (read (TtyFd, & Char, 1) == 1) {
static int EscKeyCount = 0; WaitFdWriteable (CommFd);
if (write (CommFd, & Char, 1) <0) {
Error (strerror (errno));
}
if (OutputToStdout) {if (UseColor) fwrite ("\ x1b [01; 31m", 1, 8, stderr); OutputStdChar (stderr);
if (UseColor) fwrite ("\ x1b [00m", 1, 8, stderr); fflush (stderr);
}
if (Char == '\ x1b') {EscKeyCount + +;
if (EscKeyCount> = 3)
} Else
goto ExitLabel;
EscKeyCount = 0;
}
}
}
ExitLabel:
if (tcsetattr (TtyFd, TCSANOW, & BackupTtyAttr) <0) Error ("Unable to set tty");
return 0;
}
```

1.9.7 UDP network programming

Program source code instructions

Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/net /
Driver Name	dm9000.c
Major number of the drive	without
Device name	eth0 (network equipment is not in the / dev directory there)
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/udptak
Test program source code name	udptalk.c
Test program executable file name	udptalk.c
Description: The test program compiled version available x86 version and arm, and its source code is exactly the same	

Principle of the program

TCP / IP provides a connectionless transport layer protocol: UDP (User Datagram Protocol, that is, User Datagram Protocol).UDP and TCP are very different, because there was no connection and connection-oriented socket programming socket programming, there are big differences.Since no connection is established, each sending a received datagram contains the sender and the recipient's address information.

Sending and receiving data, have to create a datagram socket means, the socket is of type SOCK_DGRAM, use the following call produces:

sockfd = socket (AF_INET, SOCK_DGRAM, 0);

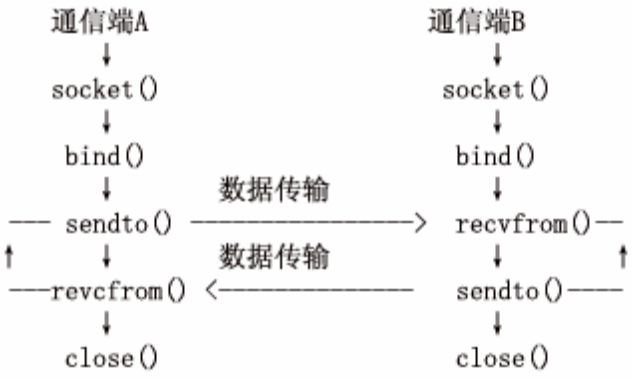
Since no connection is established, resulting in direct socket after sending and receiving of.Of course, to receive the data reported must also be bound to a port, or the sender can not know which port to send to.Sendto and recvfrom two system calls are used to send and receive datagrams, the call format:

int sendto (int s, const void * msg, int len, unsigned int flags, const struct sockaddr * to, int tolen);

int recvfrom (int, s, void * buf, int len, unsigned int flags, struct sockaddr * from, int fromlen);

Where s is used by the socket, msg and buf respectively send and receive buffer pointer, len is the length of the buffer, flags For the option flag, here is also less than, is set to 0.is sent to and from the destination address and receive the source address, contains the IP address and port information.tolen and fromlen are both to and from the length of socket address structure.These two functions return value is the actual number of bytes sent and received, or -1 for an error.

No connection with the basic communication process as shown.



The basic process of UDP traffic

The figure describes the communication port address both bind their case, but in some cases, there may be a party not bound addresses and ports.Does not bind the party's address and port allocated by the kernel.As the other party can not know in advance the party is not bound to port and IP address (assuming the host has multiple ports, these ports are assigned a different IP address), so not only by the party to be bound to issue the data reported, the other based on income to the source of the data reported in the loopback address can determine the required datagram sent address.Clearly, in this case the other party must bind address and port, and communication can only be initiated by a non-binding side.

And read () and write () is similar to the process of blocking in recvfrom () and sendto () also occur.But in different ways with TCP is that the number of bytes received a datagram 0 is possible, the application can be sendto () in the msg set to NULL, while len set to 0.

Listing

/ *

* Udptalk: Example for Matrix V; Note: This procedure also applies to S3C2440-FA

*

* Copyright (C) 2004 capbily

* Capbily@hotmail.com

* /

Include <sys/types.h>

Include <sys/socket.h>

```
# Include <arpa/inet.h>

# Include <stdio.h>


# Define BUFLEN 255


int main (int argc, char ** argv)

{

struct sockaddr_in peeraddr, / * talk to each other's IP and port storing the socket address * /

localaddr; / * local socket address * /

int sockfd;

char recmsg [BUFLEN +1];

int socklen, n;


if (argc!5

printf ("% s <dest IP address> <dest port> <source IP address> <source port> \ n", argv [0]);

exit (0);

}




sockfd = socket (AF_INET, SOCK_DGRAM, 0);

if (sockfd <0) {

printf ("socket creating err in udptalk \ n");

exit (1);

}

socklen = sizeof (struct sockaddr_in); memset (& peeraddr, 0, socklen); peeraddr.sin_family = AF_INET;
peeraddr.sin_port = htons (atoi (argv [2])); if (inet_pton (AF_INET, argv [1], & peeraddr . sin_addr) <= 0) {
```

```
printf ("Wrong dest IP address!n.

exit (0);

}

memset (& localaddr, 0, socklen);

localaddr.sin_family = AF_INET;

if (inet_pton (AF_INET, argv [3], & localaddr.sin_addr) <= 0) {

printf ("Wrong source IP address!n.

exit (0);

} Localaddr.sin_port = htons (atoi (argv [4])); if (bind (sockfd, & localaddr, socklen) <0) {

printf ("bind local address err in udptalk!n.

exit (2);

}


if (fgets (recmsg, BUFLEN, stdin) == NULL) exit (0);

if (sendto (sockfd, recmsg, strlen (recmsg), 0, & peeraddr, socklen) <0) {

printf ("sendto err in udptalk!n.

exit (3);

}


for (;;){

/ * Recv & send message loop * /

n = recvfrom (sockfd, recmsg, BUFLEN, 0, & peeraddr, & socklen);

if (n <0) {

printf ("recvfrom err in udptalk!n.

exit (4);

} Else {
```

```
/ * Successfully received packets * / recmsg [n] = 0; printf ("peer:% s", recmsg);

}

if (fgets (recmsg, BUFLEN, stdin) == NULL) exit (0);

if (sendto (sockfd, recmsg, strlen (recmsg), 0, & peeraddr, socklen) <0) {

printf ("sendto err in udptalk!n.

exit (3);

}

}

}
```

Test

Will udptalk.c compiled after a good run,

/ Opt /S3C6410-TFA/linux/examples/udptalk directory Makefile specifies two compile the target executable file, one for the host side of the x86-udptalk, a development board for arm-udptalk, run the make command Together these two programs will be compiled.You can use the arm-udptalk the method described above to download to the development board (pre-installed Linux without the program), assuming that the host's IP address is 192.168.1.108, the IP address of the development board

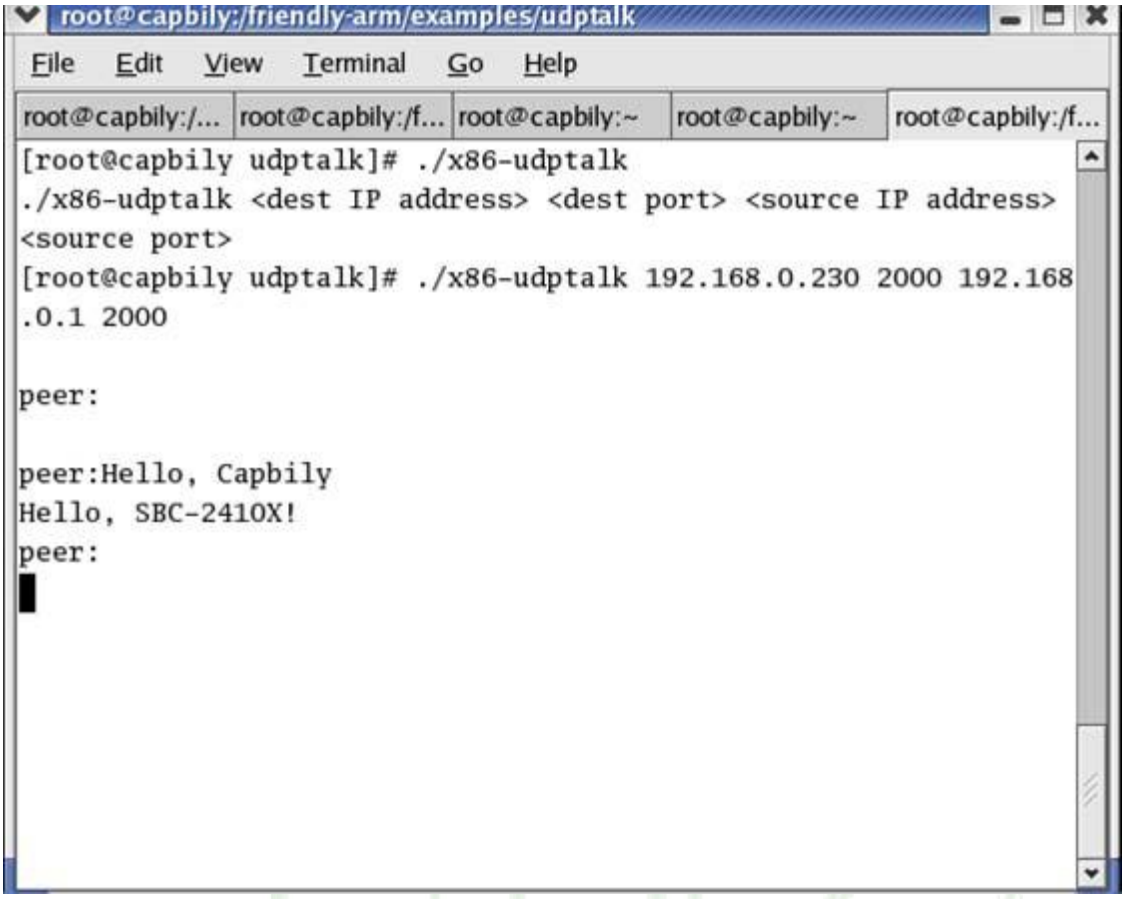
192.168.1.230. Input terminal on the host:

./x86-udptalk 192.168.1.230 2000 192.168.1.108 2000

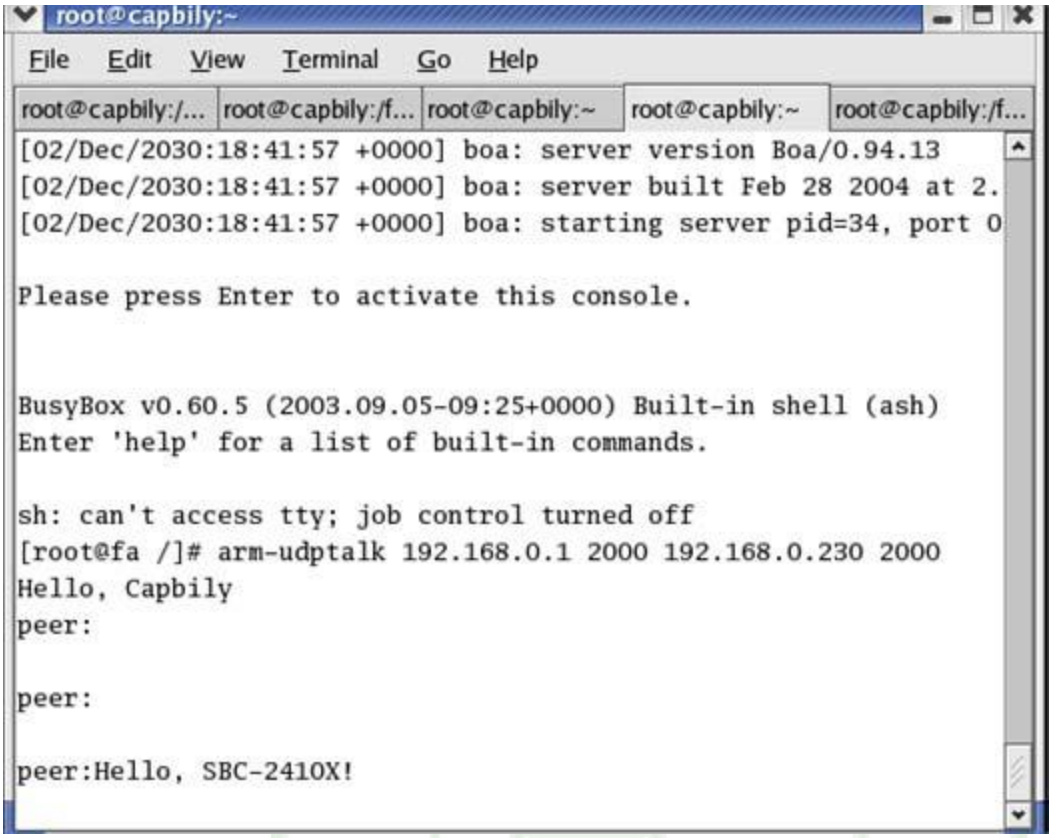
Input in the development of the terminal board

Arm-udptalk 192.168.1.108 2000 192.168.1.230 2000

Then the results are shown below:



Running on the host x86-udptalk


root@capbily:~
File Edit View Terminal Go Help
root@capbily:/... root@capbily:/f... root@capbily:~ root@capbily:~ root@capbily:/f...
[02/Dec/2030:18:41:57 +0000] boa: server version Boa/0.94.13
[02/Dec/2030:18:41:57 +0000] boa: server built Feb 28 2004 at 2.
[02/Dec/2030:18:41:57 +0000] boa: starting server pid=34, port 0
Please press Enter to activate this console.
BusyBox v0.60.5 (2003.09.05-09:25+0000) Built-in shell (ash)
Enter 'help' for a list of built-in commands.
sh: can't access tty; job control turned off
[root@fa /]# arm-udptalk 192.168.0.1 2000 192.168.0.230 2000
Hello, Capbily
peer:
peer:
peer:Hello, SBC-2410X!

The development board to run arm-udptalk

1.9.8 Sample math library calls

Program source code instructions	
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/math
Test program source code name	mathtest.c
test program executable file name	mathtest
Listing	
Note: The key is to use mathematical functions to include the header file math.h, added at compile time and math libraries libm.	

```
# Include <stdio.h>
# Include <stdlib.h>
# Include <math.h>; Note: Be sure to include the header file

int main (void)
{
double a = 8.733243;


No. - 103 - Page


printf ("sqrt (% f) =% f \ n", a, sqrt (a));
```

```
return 0;
}
Makefile content:
CROSS = arm-linux-

all: mathtest

# Note: where a mathematical function library contains libm, red
mathtest:
$ (CROSS) gcc-o mathtest main.c-lm

clean:

@ Rm-vf mathtest *. o * ~
```

You can follow the above steps to manually compile the hello program out mathtest executable file, then download it to open
Development board to run it

1.9.9 Thread programming examples

Program source code instructions	
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/pthread
Test program source code name	pthread_test.c
test program executable file name	pthread_test
Listing	
Note: Use the thread, the key is to include the header file pthread.h, and at compile time to join the thread library libpthread.	

```
# Include <stddef.h>
# Include <stdio.h>
# Include <unistd.h>
# Include "pthread.h"; Note: Be sure to include the header file


void reader_function (void); void writer_function (void); char buffer;
int buffer_has_item = 0; pthread_mutex_t mutex; main ()

{
pthread_t reader; pthread_mutex_init (& mutex, NULL); pthread_create (& reader, NULL, (void *) &
reader_function, NULL); writer_function ();
}
void writer_function (void)
{
while (1)
{
```

```
pthread_mutex_lock (& mutex);
if (buffer_has_item == 0)
{
buffer = 'a';
printf ("make a new item \ n");
buffer_has_item = 1;
}
pthread_mutex_unlock (& mutex);
}
}
void reader_function (void)
{
while (1)
{
pthread_mutex_lock (& mutex);
if (buffer_has_item == 1)
{
buffer = '\ 0';
printf ("consume item \ n");
buffer_has_item = 0;
}
pthread_mutex_unlock (& mutex);
}
}
Makefile contents
CROSS = arm-linux-


all: pthread


# Note: The Department includes the thread library libphread, red

pthread:


$ (CROSS) gcc-static-o pthread main.c-lpthread

clean:


@ Rm-vf pthread *. o * ~
```

Hello you can follow the above steps to manually compile the program executable file pthread, then downloaded to the development Board to run it

1.9.10 Pipeline Application Programming Example - Web control LED

Program source code instructions	
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/led-player
Test program source code name	led-player.c
test program executable file name of the Rationale	led-player

Rationale

We can boot via the web to send commands to control the development board of the LED blink mode, in fact, inter-process communication is a typical example of shared resources, inter-process communication is the IPC (InterProcess Communication), general purpose inter-process communication are:
(1) data
(2) shared data
(3) Notification events
(4) the sharing of resources
(5) process control.

Linux supports a variety of IPC mechanisms, signals and pipeline is one of the two.For a more detailed inter-process communication, the general Linux
Programming books are introduced, we have much to say in this.
Through the web to control the LED blink mode is achieved through the pipeline mechanism, in which LED is a shared resource, led-player is a daemon, when it starts to create a named pipe / tmp / led-control (of course, the pipeline can also be created by the mknod command, so the program must be rewritten, and are interested can see for yourself), and has been monitoring the data input of the pipeline, according to different parameters (model type and cycle period) to change the LED display mode ; leds.cgi is a gateway program, it receives over the characters sent from the web form command (ping ping-pong mode or on behalf of Marquee mode, counter mode on behalf of the counter, stop on behalf of the stop mode, slow behalf cycle 0.25m, normal cycle on behalf of is 0.125m, fast behalf cycle 0.0625m), and assign these instructions into actual numbers, then call the echo command to pipe delivery / tmp / led-control in order to achieve control of an LED, the following is their list of procedures .
Listing

```
# Include <stdio.h>
# Include <stdlib.h>
# Include <unistd.h>
# Include <sys/ioctl.h>
# Include <sys/types.h>
# Include <sys/stat.h>
# Include <fcntl.h>
```

Section --106-- page

```
# Include <sys/select.h>
# Include <sys/time.h>
# Include <string.h>


static int led_fd;
static int type = 1;


static void push_leds (void)
{
static unsigned step; unsigned led_bitmap; int i;


switch (type) {
case 0:
if (step> = 6) {
step = 0;
}
if (step <3) {
led_bitmap = 1 <<step;
} Else {
led_bitmap = 1 <<(6 - step);
}
break;
case 1:
if (step> 255) {
step = 0;
}
led_bitmap = step;
break;
default:
led_bitmap = 0;
}
step + +;
for (i = 0; i <4; i + +) {
ioctl (led_fd, led_bitmap & 1, i);
led_bitmap>> = 1;
}
```

```
}

int main (void)
{
int led_control_pipe;
int null_writer_fd; / / for read endpoint not blocking when control process exit


double period = 0.5;


led_fd = open ("/ dev/leds0", 0);
if (led_fd <0) {
led_fd = open ("/ dev / leds", 0);
}
if (led_fd <0) {
perror ("open device leds");
exit (1);
}
unlink ("/ tmp / led-control");
mkfifo ("/ tmp / led-control", 0666);


led_control_pipe = open ("/ tmp / led-control", O_RDONLY | O_NONBLOCK);
if (led_control_pipe <0) {
perror ("open control pipe for read");
exit (1);
}
null_writer_fd = open ("/ tmp / led-control", O_WRONLY | O_NONBLOCK);
if (null_writer_fd <0) {
perror ("open control pipe for write");
exit (1);
}


for (;;) {
fd_set rds;
struct timeval step;
int ret;


FD_ZERO (& rds); FD_SET (led_control_pipe, & rds); step.tv_sec = period;
step.tv_usec = (period - step.tv_sec) * 1000000L;
```

```
ret = select (led_control_pipe + 1, & rds, NULL, NULL, & step);

if (ret <0) {perror ("select"); exit (1);
}
if (ret == 0) {
push_leds ();
} Else if (FD_ISSET (led_control_pipe, & rds)) {
static char buffer [200];
for (;;) {
char c;
int len = strlen (buffer);
if (len> = sizeof buffer - 1) {memset (buffer, 0, sizeof buffer); break;
}
if (read (led_control_pipe, & c, 1)!1
break;
}
if (c == '\ r') {
continue;
}
if (c == '\ n') {
int tmp_type;
double tmp_period;
if (sscanf (buffer, "% d% lf", & tmp_type, & tmp_period) == 2) {
type = tmp_type;
period = tmp_period;
}
fprintf (stderr, "type is% d, period is% lf \ n", type, period);
memset (buffer, 0, sizeof buffer);
break;
}
buffer [len] = c;
}
}
}

close (led_fd);
return 0;
}
```

Make command can be directly compiled using a led-player executable file, it is placed in the server as a development board for the / sbin directory.

Leds.cgi gateway source code (the program on the development board position: / www / leds.cgi), showing that the Gateway program is actually a shell script, it is called as a web leds.html implement "action" The script lists the following:

```
Leds.cgi script list
#!/ Bin / sh


type = 0 period = 1


case $ QUERY_STRING in
* Ping *)
type = 0
;;
* Counter *)
type = 1
;;




esac
* Stop *)


type = 2
;;


case $ QUERY_STRING in
* Slow *)
period = 0.25
;;
* Normal *)
period = 0.125
;;




esac
* Fast *)


period = 0.0625
;;
```

```
/ Bin / echo $ type $ period> / tmp / led-control


echo "Content-type: text / html; charset = gb2312"

echo
/ Bin / cat led-result.template


exit 0
```

1.9.11 Based on the C + + Hello, World

Program source code instructions	
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/c + +
Test program source code name	cplus.c + +
test program executable file name	cplus
Listing	

```
# Include <iostream>
# Include <cstring>
using namespace std;


class String
{
private:


public:
char * str;
String (char * s)
{
int lenght = strlen (s);
str = new char [lenght +1];
strcpy (str, s);
}
~ String ()
{
cout <<"Deleting str. \ n";
delete [] str;
}
void display ()
{
cout <<str <<endl;
}
};
```

```
int main (void)
{



Section --111-- page

String s1 = "Hello world";
cout <<"s1 ="; s1.display (); return 0;
double num, ans;


cout <<"Enter num:";
}
```

Run it You can follow the above steps to manually compile the hello program out cplus executable file, then downloaded to the development board

1.10 Examples of embedded Linux drivers

The previous section we introduced a simple Linux program Hello, World, which is run in user mode applications, and now we start with a run in kernel mode Hello, World program began, the driver described the preparation and use.

1.10.1 Hello, Module-simple embedded Linux driver module

Program source code instructions	
Source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char
Source code file name	S3C6410-TFA_hello_module.c
Major number of the drive	without
Device name	No
The test program source code directory	No
Name of test procedures	No
Test program executable file name	No
Description: The driver will not load any of the dev device nodes to create	

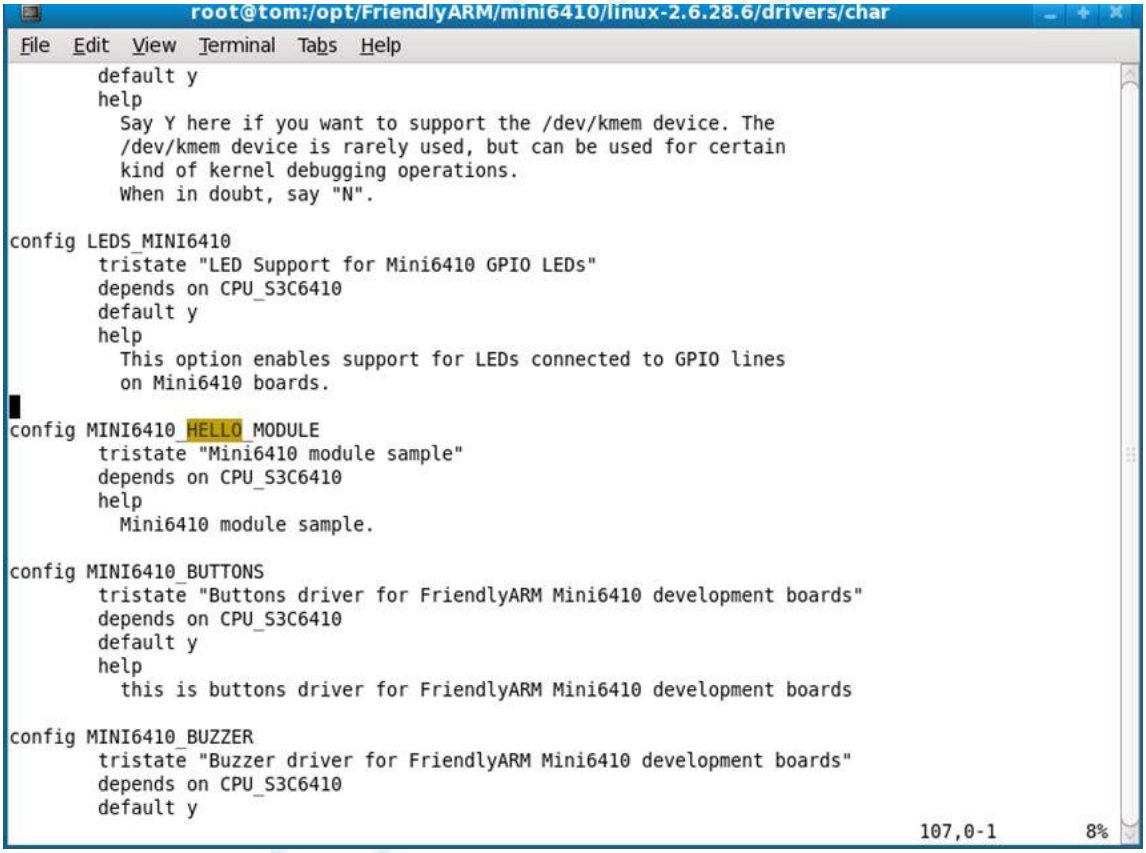
```
Listing
# Include <linux/kernel.h>
# Include <linux/module.h>
static int init S3C6410-TFA_hello_module_init (void)
{
printk ("Hello, S3C6410-TFA module is installed!n.
return 0;
}
static void exit S3C6410-TFA_hello_module_cleanup (void)
{
printk ("Good-bye, S3C6410-TFA module was removed!n.
```

```
}
module_init (S3C6410-TFA_hello_module_init); module_exit (S3C6410-TFA_hello_module_cleanup);
MODULE_LICENSE ("GPL");
```

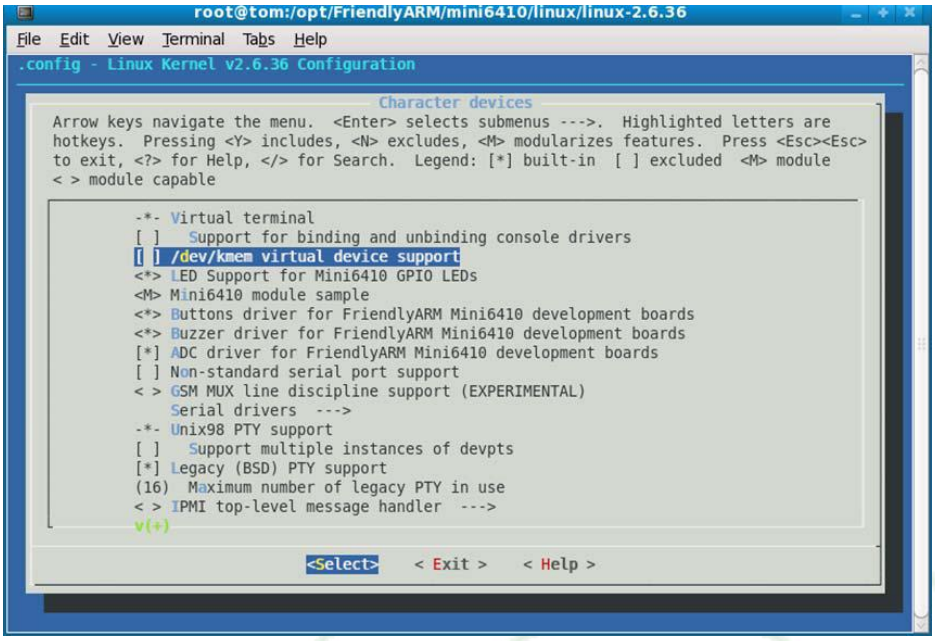
(1) the Hello, Module added to the kernel source tree, and compile

Generally compiled 2.6 version of the driver needs to drive the module code to the kernel source tree, and do the appropriate configuration, the following steps (Note: The following steps are already done in fact, you only need to open the check directly to build on it):

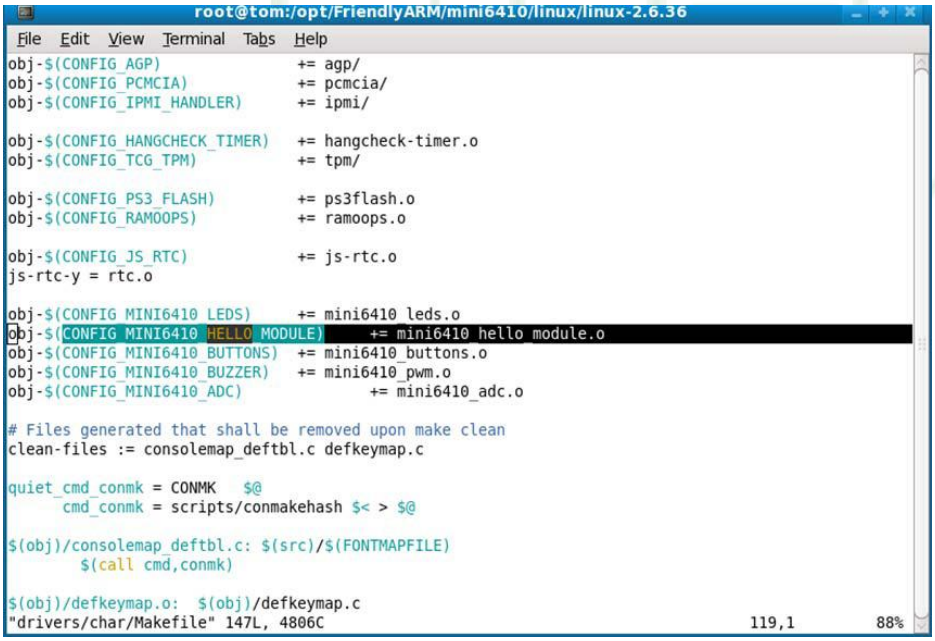
Step1: Edit the configuration file Kconfig, add driver option, so that in a time of make menuconfig open linux-2.6.36/drivers/char/Kconfig file, add the figure shown below:


root@tom:/opt/FriendlyARM/mini6410/linux-2.6.28.6/drivers/char
File Edit View Terminal Tabs Help
default y
help
Say Y here if you want to support the /dev/kmem device. The
/dev/kmem device is rarely used, but can be used for certain
kind of kernel debugging operations.
When in doubt, say "N".
config LEDS_MINI6410
tristate "LED Support for Mini6410 GPIO LEDs"
depends on CPU_S3C6410
default y
help
This option enables support for LEDs connected to GPIO lines
on Mini6410 boards.
config MINI6410_HELLO_MODULE
tristate "Mini6410 module sample"
depends on CPU_S3C6410
help
Mini6410 module sample.
config MINI6410_BUTTONS
tristate "Buttons driver for FriendlyARM Mini6410 development boards"
depends on CPU_S3C6410
default y
help
this is buttons driver for FriendlyARM Mini6410 development boards
config MINI6410_BUZZER
tristate "Buzzer driver for FriendlyARM Mini6410 development boards"
depends on CPU_S3C6410
default y
107,0-1 8%

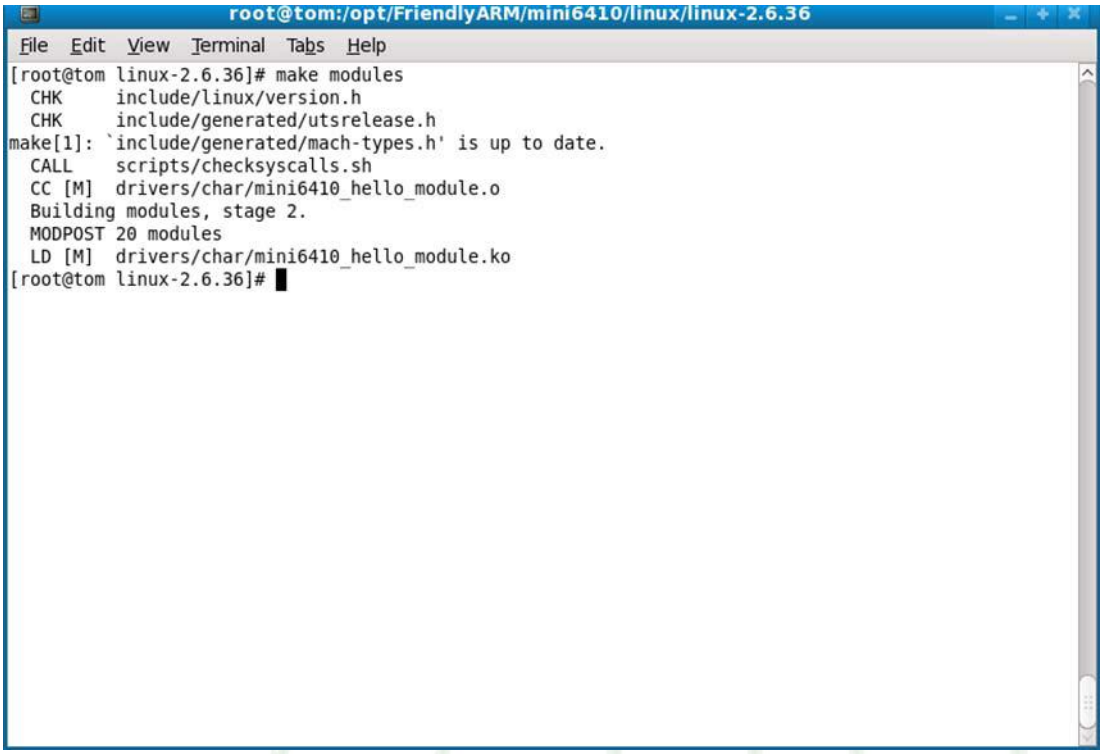
Save and exit, then the location in linux-2.6.36 directory you can run the make menuconfig Device Drivers Æ Character devices in the menu to see just the added option, and press the space bar will be selected as <M>, This means that the option should compile as a module; then press the space becomes <*>, which means should this option compiled into the kernel, we choose <M>, figure, if not appear, please check that you have loaded the default kernel configuration file, see section 1.5.1.


root@tom:/opt/FriendlyARM/mini6410/linux/linux-2.6.36
File Edit View Terminal Tabs Help
.config - Linux Kernel v2.6.36 Configuration
Character devices
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module < > module capable
-*- Virtual terminal
[ ] Support for binding and unbinding console drivers
[ ] /dev/kmem virtual device support
<*> LED Support for Mini6410 GPIO LEDs
<M> Mini6410 module sample
<*> Buttons driver for FriendlyARM Mini6410 development boards
<*> Buzzer driver for FriendlyARM Mini6410 development boards
[*] ADC driver for FriendlyARM Mini6410 development boards
[ ] Non-standard serial port support
< > GSM MUX line discipline support (EXPERIMENTAL)
Serial drivers --->
-*- Unix98 PTY support
[ ] Support multiple instances of devpts
[*] Legacy (BSD) PTY support
(16) Maximum number of legacy PTY in use
< > IPMI top-level message handler --->
v(+)
<Select> < Exit > < Help >

Step2: By the previous step, although we can choose when configuring the kernel, but in fact at this time or can not perform S3C6410-TFA_hello_module.c kernel compiled, but also need to put in the Makefile in the kernel configuration options and the actual source code linked open linux-2.6.36/drivers/char/Makefile, add and save and exit in Figure:



Step3: Then back to linux-2.6.36 source code root directory location, execute make modules, we can produce the required documents S3C6410-TFA_hello_module.ko a kernel module, Beware: make modules, you must first execute make zImage, only need it once. So far, we have completed the module-driven compilation.



(2) to Hello, Module downloaded and installed using the development board

In this use the ftp command to compile out of the S3C6410-TFA_hello_module.ko downloaded to the board and move it to / lib/modules/2.6.36 directory and then execute the board in the present

Modprobe S3C6410-TFA_hello_module

You can see that the module has been loaded (Note: Use the modprobe command to load the module does not require added "ko" Last

Suffix)

And then execute the following command, you can see that the module is unloaded

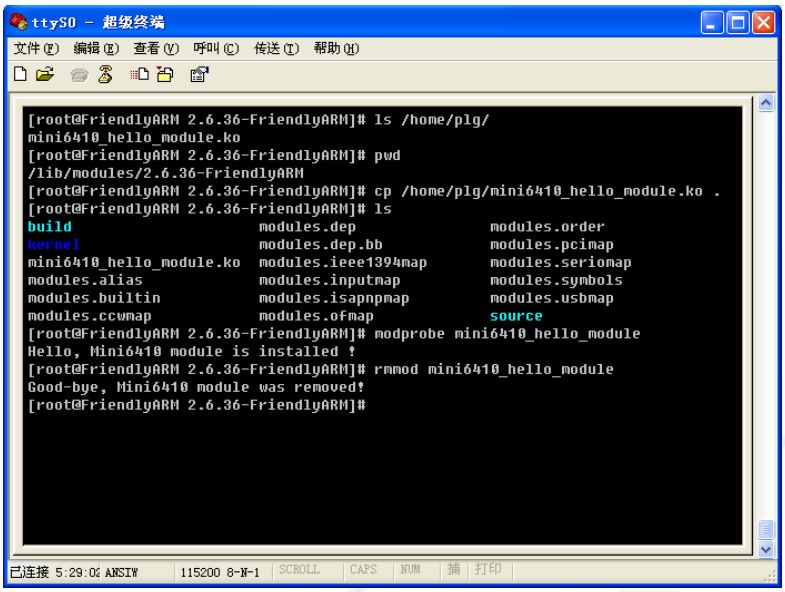
Rmmod S3C6410-TFA_hello_module

Note: To be able to properly unload the module, the module must be put into the development board

/ Lib/modules/2.6.36 directory Also to note: because our core updates sometimes, if the kernel version has changed, please follow

According to the specific kernel version the module to re-establish a store directory, this is / lib/modules/2.6.36

The whole process as below:



1.10.2 LED driver

In the previous section, we introduce a simple Hello, Module driver module, it is just some information from the serial output, does not correspond to the hardware to operate the board, in the embedded Linux system, similar to most of the hardware needed driver to operate, such as touch screen, network cards, audio, etc., where we introduce some simple typical example, the driver actually has a complex reference code, do not have to write from scratch drive.From the beginning of this section, we will introduce some of the drivers and hardware are closely related, they are the real drivers Embedded Linux.

Write the actual drive, it is necessary to understand the associated hardware resources, such as the use of registers, physical address, interrupt, etc., where, LED is a very simple example, it uses the following hardware resources. The development board used in the four LED's hardware resources

LED	corresponding to the name of the IO registers	The corresponding CPU pin
LED1	GPK4	R23
LED2	GPK5	R22
LED3	GPK6	R24
LED4	GPK7	R25

IO are used to operate the mouth, it is necessary to set the registers used by them, we need to call some of the existing function or macro, is used in this readl and writel, they will report directly to the appropriate read and write registers the operation. Driver in the list below, you can see they are calling the situation.In addition, you may also need to call a number and device drivers are closely related to basic functions such as registration device misc_register, fill out the drive function structure file_operations, as well as Hello, Module in module_init and module_exit function as such.

Some functions are not necessary, as you learn more about Linux driver development and read more code, you naturally understand.

Program source code instructions

Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char
Driver Name	S3C6410-TFA_leds.c
Device number	Led is misc device, the device automatically generates
Device name	/ dev / leds
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/leds
Test program name	led.c
Test program executable file name	Led
Description: LED driver has been compiled into the default kernel, so can not be loaded using insmod.	
Listing	

```
# Include <linux/miscdevice.h>
# Include <linux/delay.h>
# Include <asm/irq.h>
/ / # Include <mach/regs-gpio.h>
# Include <mach/hardware.h>
# Include <linux/kernel.h>
# Include <linux/module.h>
# Include <linux/init.h>
# Include <linux/mm.h>
# Include <linux/fs.h>
# Include <linux/types.h>
# Include <linux/delay.h>
# Include <linux/moduleparam.h>
# Include <linux/slab.h>
# Include <linux/errno.h>
# Include <linux/ioctl.h>
# Include <linux/cdev.h>
# Include <linux/string.h>
# Include <linux/list.h>
# Include <linux/pci.h>
# Include <asm/uaccess.h>
# Include <asm/atomic.h>
# Include <asm/unistd.h>


# Include <mach/map.h>
# Include <mach/regs-clock.h>
# Include <mach/regs-gpio.h>


# Include <plat/gpio-cfg.h>
# Include <mach/gpio-bank-eh>
# Include <mach/gpio-bank-kh>
```

```
# Define DEVICE_NAME "leds"


static long sbc2440_leds_ioctl (struct file * filp, unsigned int cmd, unsigned long arg)
{
switch (cmd) {
unsigned tmp;
case 0:
case 1:
if (arg> 4) {
return-EINVAL;
}
tmp = readl (S3C64XX_GPKDAT);
tmp & = ~ (1 <<(4 + arg));
tmp | = ((!cmd) <<(4 + arg));
writel (tmp, S3C64XX_GPKDAT);
/ / Printk (DEVICE_NAME ":% d% d \ n", arg, cmd);
return 0;
default:
return-EINVAL;
}
}

static struct file_operations dev_fops = {
. Owner = THIS_MODULE,
. Unlocked_ioctl = sbc2440_leds_ioctl,
};

static struct miscdevice misc = {
. Minor = MISC_DYNAMIC_MINOR,
. Name = DEVICE_NAME,
. Fops = & dev_fops,
};

static int init dev_init (void)
{
int ret;


{
unsigned tmp;
tmp = readl (S3C64XX_GPKCON);
```

```
tmp = (tmp & ~ (0xffffU <<16)) | (0x1111U <<16);
writel (tmp, S3C64XX_GPKCON);

tmp = readl (S3C64XX_GPKDAT);
tmp | = (0xF <<4);
writel (tmp, S3C64XX_GPKDAT);
}

ret = misc_register (& misc);

printk (DEVICE_NAME "\ tinitialized \ n");

return ret;
}

static void exit dev_exit (void)
{
misc_deregister (& misc);
}

module_init (dev_init); module_exit (dev_exit); MODULE_LICENSE ("GPL");
MODULE_AUTHOR ("hello world.");
```

1.10.3 Key Drivers

Program source code instructions		
Driver source code directory	/ opt /S3C6410-TFA/linux/linux-2.6.36/drivers/char	
Name	S3C6410-TFA_buttons.c	
The driver's major number generated	Misc equipment, device number will be automatically	
Device name	/ dev / buttons	
The test program source code directory	/ opt /S3C6410-TFA/linux/examples/buttons	
Test program source code name	buttons	
_test.c test program executable file name of the	buttons	
Note: Key drivers have been compiled into the default kernel, so can not be loaded using insmod.		
Development board of the key resources used		
Button	the name of the corresponding interrupt IO register	corresponding to
K1	GPN0	EINT0
K2	GPN1	EINT1
K3	GPN2	EINT2
K4	GPN3	EINT3

K5	GPN4	EINT4
K6	GPN5	EINT5
K7	GPL11	EINT19
K8	GPL12	EINT20

Listing

```
# Include <linux/module.h>
# Include <linux/kernel.h>
# Include <linux/fs.h>
# Include <linux/init.h>
# Include <linux/delay.h>
# Include <linux/poll.h>
# Include <linux/irq.h>
# Include <asm/irq.h>
# Include <asm/io.h>
# Include <linux/interrupt.h>
# Include <asm/uaccess.h>
# Include <mach/hardware.h>
# Include <linux/platform_device.h>
# Include <linux/cdev.h>
# Include <linux/miscdevice.h>


# Include <mach/map.h>
# Include <mach/regs-clock.h>
# Include <mach/regs-gpio.h>


# Include <plat/gpio-cfg.h>
# Include <mach/gpio-bank-nh>
# Include <mach/gpio-bank-lh>


# Define DEVICE_NAME "buttons"


struct button_irq_desc {
int irq;
int number;
char * name;
};



static struct button_irq_desc button_irqs [] = {
```

```
{IRQ_EINT (0), 0, "KEY0"},
{IRQ_EINT (1), 1, "KEY1"},
{IRQ_EINT (2), 2, "KEY2"},
{IRQ_EINT (3), 3, "KEY3"},
{IRQ_EINT (4), 4, "KEY4"},
{IRQ_EINT (5), 5, "KEY5"},
{IRQ_EINT (19), 6, "KEY6"},
{IRQ_EINT (20), 7, "KEY7"},
};
static volatile char key_values [] = {'0 ', '0', '0 ', '0', '0 ', '0', '0 ', '0'};


static DECLARE_WAIT_QUEUE_HEAD (button_waitq);


static volatile int ev_press = 0;



static irqreturn_t buttons_interrupt (int irq, void * dev_id)
{
struct button_irq_desc * button_irqs = (struct button_irq_desc *) dev_id;
int down; int number; unsigned tmp;


udelay (0);
number = button_irqs-> number;
switch (number) {
case 0: case 1: case 2: case 3: case 4: case 5: tmp = readl (S3C64XX_GPNDAT); down =! (tmp & (1 <<number));
break;
case 6: case 7:
tmp = readl (S3C64XX_GPLDAT); down =! (tmp & (1 <<(number + 5))); break;
default:
down = 0;
}

if (down!= (Key_values [number] & 1)) {
key_values [number] = '0 '+ down;


ev_press = 1;
wake_up_interruptible (& button_waitq);
}
```

```
return IRQ_RETVAL (IRQ_HANDLED);
}



static int s3c64xx_buttons_open (struct inode * inode, struct file * file)
{
int i;
int err = 0;


for (i = 0; i <sizeof (button_irqs) / sizeof (button_irqs [0]); i + +) {
if (button_irqs [i]. irq <0) {
continue;
}
err = request_irq (button_irqs [i]. irq, buttons_interrupt, IRQ_TYPE_EDGE_BOTH, button_irqs [i]. name, (void *)
& button_irqs [i]);
if (err)
break;
}


if (err) {
{0}I.{/0}{1} {/1}
for (; i> = 0; i -) {
if (button_irqs [i]. irq <0) {
continue;
}
disable_irq (button_irqs [i]. irq);
free_irq (button_irqs [i]. irq, (void *) & button_irqs [i]);
}
return-EBUSY;
}


ev_press = 1;

return 0;
}
```

```
static int s3c64xx_buttons_close (struct inode * inode, struct file * file)
{
int i;


for (i = 0; i <sizeof (button_irqs) / sizeof (button_irqs [0]); i + +) {
if (button_irqs [i]. irq <0) {
continue;
}
free_irq (button_irqs [i]. irq, (void *) & button_irqs [i]);
}


return 0;
}



static int s3c64xx_buttons_read (struct file * filp, char user * buff, size_t count, loff_t * offp)
{
unsigned long err;


if (!ev_press) {
if (filp-> f_flags & O_NONBLOCK)
return-EAGAIN;
else


}

wait_event_interruptible (button_waitq, ev_press);

ev_press = 0;

err = copy_to_user ((void *) buff, (const void *) (& key_values), min (sizeof (key_values), count));

return err?-EFAULT: min (sizeof (key_values), count);
}
static unsigned int s3c64xx_buttons_poll (struct file * file, struct poll_table_struct * wait)
{
unsigned int mask = 0;
```

```
poll_wait (file, & button_waitq, wait);
if (ev_press)
mask | = POLLIN | POLLRDNORM;
return mask;
}

static struct file_operations dev_fops = {
. Owner = THIS_MODULE,
. Open = s3c64xx_buttons_open,
. Release = s3c64xx_buttons_close,
. Read = s3c64xx_buttons_read,
. Poll = s3c64xx_buttons_poll,
};

static struct miscdevice misc = {
. Minor = MISC_DYNAMIC_MINOR,
. Name = DEVICE_NAME,
. Fops = & dev_fops,
};


static int init dev_init (void)
{
int ret;

ret = misc_register (& misc);

printk (DEVICE_NAME "\ tinitialized \ n");

return ret;
}

static void exit dev_exit (void)
{
misc_deregister (& misc);
}

module_init (dev_init); module_exit (dev_exit); MODULE_LICENSE ("GPL");

MODULE_AUTHOR ("hello.");
```

1.11 compile Qtopia-2.2.0

Qtopia-2.2.0 compile because of the configuration process is more complex, in order to facilitate beginners to learn and easy to use, we make the steps to configure and compile into a build script, simply run the script to compile the Qtopia platform, and to their own all applets; by "run" script you can run them, x86 and arm version of the steps are basically the same, but the script content is slightly different, the steps are detailed below.

1.11.1 extracting installer source code

See section 1.4.1

1.11.2 Compiling and running the x86 version of Qtopia-2.2.0

Letter to: develop and test our software platform to develop all based Fedora9, all configuration and build scripts are based on this platform, we have not tested on other platforms.If you are familiar with Linux development Hen, I believe you will find step by step according to error causes and solutions, they generally lack the platform you use some libraries or tools and other causes; Otherwise, we recommend beginners to use and we agreed platform, that Fedora 9 (full name: Fedora-9-i386-DVD.iso), you can download at its official website (ftp://download.fedora.redhat.com/pub/fedora/linux/releases/9 / Fedora/i386/iso/Fedora-9-i386-DVD

. Iso, does not guarantee long-term effective), you can get in other places, they are the same, be sure to refer to our installation manual provides step, which is the result of rigorous testing, so as not to miss some of the development of the group when needed pieces.

Many Linux distributions, we can not write this document explains installation of eleven, please understand.

Into the working directory, execute the following command

Cd / opt /S3C6410-TFA/linux/x86-qtopia

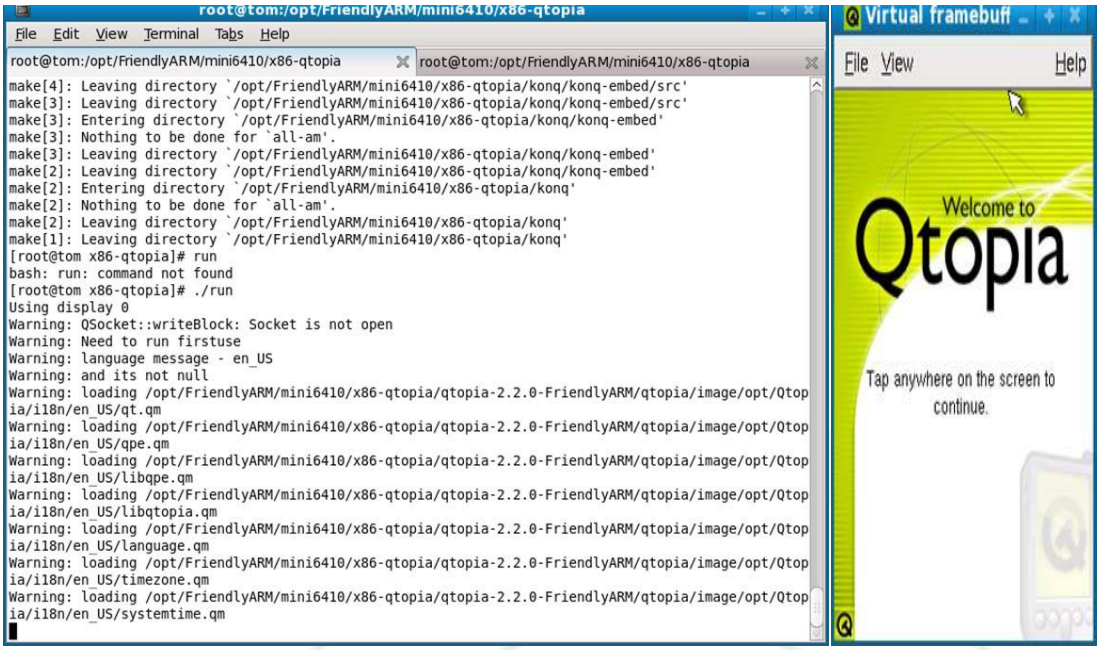
#. / Build-all (the process is long, you need to run about 30 minutes)

Description:. / Build-all will automatically compile a complete and Qtopia embedded browser, you can have execute. / Build

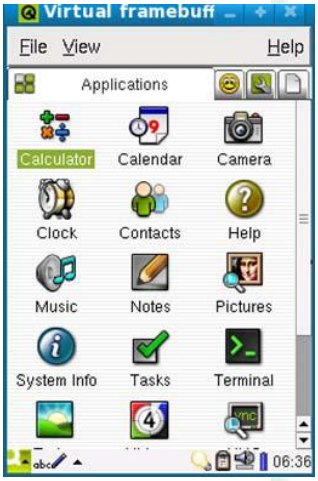
And. / Build-konq script command to compile them separately, if you do not have the smooth implementation, please refer to the above description of the red font.

Command:

You just want to run out of Qtopia build system is very simple, just the compiled command in the terminal, enter the following #. / Run; note that "/" in front of a ".", Which means that the implementation in the current directory then you can see the following interface



Follow the prompts to click to run, you can see Qtopia system, as follows, note that: we do not make x86 version of the Chinese system.



1.11.3 Compiling and running version of Qtopia-2.2.0 arm

Make sure you are using the compiler version arm-linux-gcc-4.4.1, run the platform for Fedora 9, to enter the working directory, execute the following command

Cd / opt /S3C6410-TFA/linux/arm-qtopia

#. / Build-all (the process is long, you need to run about 30 minutes)

#. / Mktarget (made applicable to the target root file system image file binary package, will generate

target-qtopia-konq.tgz)

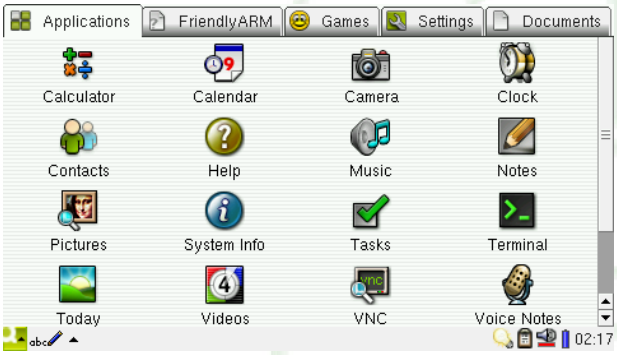
Description:. / Build-all will automatically compile a complete and Qtopia embedded browser, and the compiler-generated system supports Jpeg, GIF, PNG and other image formats, you can also have execute. / Build and. / Build-konq script command to compile them separately.If you do not have the smooth implementation, please refer to the section at the beginning of the red font description.

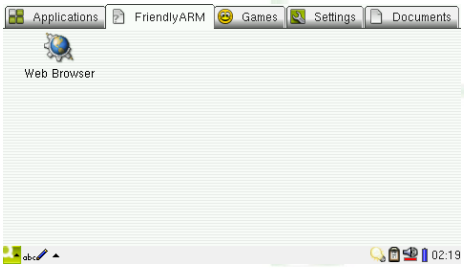
You can delete any original Qtopia development board system, as long as the / opt directory, all files can be deleted.And then just generate target-qtopia-konq.tgz through USB or other means to extract the root directory of the development board, assuming that we have spread it through the ftp / home / plg directory, then execute the command terminal board :

Tar xvzf / home / plg / target-qtopia-konq.tgz-C /

One "C" is the meaning of Change, "C" after the "/" represents extract to the root directory, is finished, restart the development board, you can see all the interfaces have become English, only a browser program, which is your own to get the Qtopia build system, as shown:

Note: The new system pre-installed system may use the touch screen calibration parameters / etc / pointercal, you can also delete the old system, when it be deleted, so it will boot into the correct interface.





The above process may seem very simple, in fact, all the secrets are in the build-all script, there are many online articles about migration, but the essential steps are those recorded in the script, you can use Notepad to open the self-check tool , but none of those hip-hop rhetoric Humor nothing.

1.12 Compile QtE-4.7.0

1.12.1 extracting installer source code

See section 1.4.1

1.12.2 Arm version compile and run the QtE-4.7.0

Note, be sure to use our CD-ROM provided in the cross-compiler arm-linux-gcc-4.5.1, and based on Fedora9 platform, Fedora9 installation steps, see 1.3.1, we can not guarantee that the script can be produced in other platform environments smooth implementation, which we do not provide support.

And Qtopia-2.2.0 is very similar, we also QtE-4.7.0 compiler produced a ready-made script build-all, into the source code directory:

Cd / opt /S3C6410-TFA/linux/arm-qte-4.7.0

#. / Build-all this process will be very long, according to the different machine configurations, have different compile-time, please be patient. When successfully executed, and then run mktarget script, will be the directory from the compiled object file, the extract must be

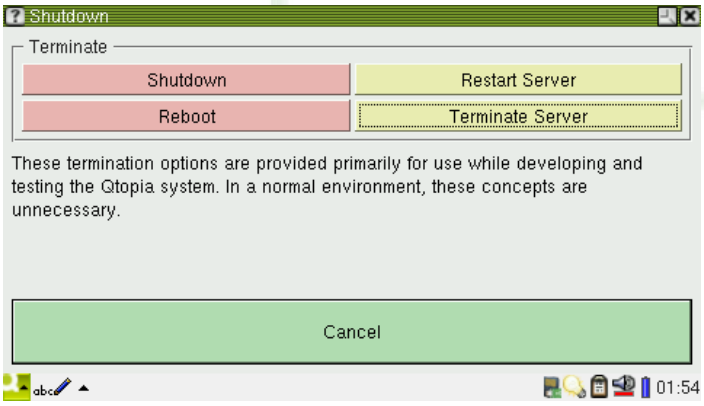
QtE-4.7.0 libraries to the executable binary files and example, and package for the target-qte-4.7.0.tgz, put it in the development of root decompression board, you can use, the following command

Tar xvzf target-qte-4.7.0.tgz-C /

This will be in / usr / local / Trolltech directory create a build directory, it contains all required to run the executable files and libraries.

Instructions for use: because the target board pre-installed Linux has included QtE-4.7.0, before the test, you can delete the original, which is located in / usr / local / Trolltech directory to the directory using the rm command to completely remove the it.

To run QtE-4 .. 6.3, is recommended to stop the running Qtopia-2.2.0, click "Settings" in the "off" to the following interface, point "Terminate Server" to close the Qtopia-2.2.0 system.



You can also use other methods, such as the startup script / etc / init.d / rcS in the comment qtopia startup items, and then re-system system; or use the killall command to kill the relevant process (more; or even directly remove the / opt All contents of the directory to restart.

After the close qtopia-2.2.0, qt4 commands at the command line, you can start the installation just extract the QtE-4.7.0 A, as shown:

1.13 Compile Qtopia4 (Qt-Extended-4.4.3)

1.13.1 extracting installer source code

See section 1.4.1

1.13.2 Compiling and running the x86 version of Qt-Extended-4.4.3

Note, be sure to use our CD-ROM provided in the cross-compiler arm-linux-gcc-4.5.1, and based on Fedora9 platform, Fedora9 installation steps, see 1.3.1, we can not guarantee that the script can be produced in other platform environments smooth implementation, which we do not provide support.

And Qtopia-2.2.0 is very similar, we also Qt-Extended-4.4.3 (hereinafter referred to as Qtopia4) compiled a ready made script build, enter the source code directory:

Cd / opt /S3C6410-TFA/linux / x86-qt-extended-4.4.3

#. / Build this process will be very long, according to the different machine configurations, have different compile-time, please be patient. You just compiled to run out of Qtopia4 system is very simple, just the compiled terminal, enter the following command

Command:

#. / Run; note that "/" in front of a ".", Which means that the implementation in the current directory then you can see the following interface, according to the function of cue points you can see into the form, if you are interested, you can customize

Click to see the line inside the function, will not go.

1.13.3 compile and run arm version of the Qt-Extended-4.4.3

Note, be sure to use our CD-ROM provided in the cross-compiler arm-linux-gcc-4.5.1, and based on Fedora9 platform, Fedora9 installation steps, see 1.3.1, we can not guarantee that the script can be produced in other platform environments smooth implementation, which we do not provide support.

And Qtopia-2.2.0 is very similar, we also Qt-Extended-4.4.3 compiler produced a ready-made scripts build, enter the source code directory:

Cd / opt /S3C6410-TFA/linux / arm-qt-extended-4.4.3

#. / Build this process will be very long, according to the different machine configurations, have different compile-time, please be patient. When successfully executed, and then run mktarget script, will be the directory from the compiled object file, the extract must be

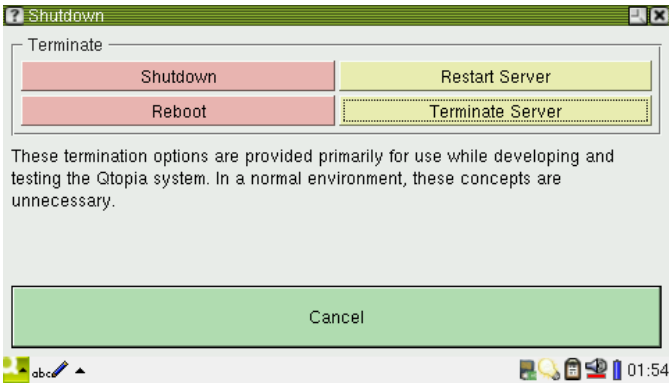
Want Qt-Extended-4.4.3 libraries and executable binary example, and package for the target-qtopia4.tgz, put it in the development of root decompression board, you can use, the following command

Tar xvzf target-qtopia4.tgz-C /

This will be in the / opt directory to create generation Qtopia4.4.3 directory, it contains all required to run the executable files and libraries.

Instructions for use: because the target board pre-installed Linux has included QtE-4.7.0, before the test, you can delete the original, which is located in / opt / Qtopia4.4.3 directory to the directory using the rm command to completely remove the it.

To run Qtopia4, recommended to stop the running Qtopia-2.2.0, click "Settings" in the "off" to the following interface, point "Terminate Server" to close the Qtopia-2.2.0 system.



You can also use other methods, such as the startup script / etc / init.d / rcS in the comment qtopia startup items, and then re-system system; or use the killall command to kill the relevant process (more; or even directly remove the / opt All contents of the directory to restart.

After the close qtopia-2.2.0, at the command line "qtopia4 &" (where "&" that runs in the background) command, you can start just extract the installation Qtopia4, shown in Figure:

1.14 choose which version of Qt to develop

With so many versions of Qt, there are many users do not know how to choose, in fact, there is no standard answer, we think it depends on your needs, and the latest is not good, nor is the old version it is not good.

Platform for the development board, we need a full desktop system (Qtopia desktop system is the handheld device), so suitable for a variety of resolution on the LCD display can have a good effect, for the display of the development board various functions, so we developed based on Qtopia-2.2.0 small programs, and implemented and Qtopia4, QtE-4.7.0 Coexistence and other free to switch, in essence, these implementations are not very new very stylish use of technology, They are more basic Linux C or C + + programming, graphical user interface is just a shell, but this has met our needs.

If your application does not require complete desktop system, but a separate two applications, we recommend using QtE-4.7 or later, because of their cross-platform development of better, it may be easier for beginners to master and transplantation , a description is a separate application QtE-4.7 is not very large footprint.